

**SAFETY PROGRAM  
AND  
MANAGEMENT GUIDE**

Utah State Office  
for  
Applied Technology Education

Steven O. Laing  
State Superintendent of Public Instruction

Robert O. Brems  
Associate Superintendent  
for Applied Technology Education

Allen Edwards  
Utah State Division of Risk Management

Richard Stowell  
Utah School Boards Association

Salt Lake City  
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# Acknowledgments

## SAFETY DEVELOPMENT COMMITTEE

Appreciation is expressed to the following people,  
who assisted in the development of this guide.

### Participants

David Milliken

Buddy Deimler

Melvin Robinson

John Hicks

Steve Hewlett

Clay Christensen

Joe Seeley

Waldo Warnick

Neil Hancey

Scott Zigich

### Representing

State Specialist, T & I

State Specialist, Agriculture

State Specialist, Tech. Ed

Utah State Division of Risk Management

Utah State Division of Risk Management

Administration

Post-Secondary Education

Secondary Ed. High School

Secondary Ed. Jr. High

District Safety Officers

Alaina Lowry-Naranjo, Editor

# Foreword

This publication has been prepared as a guide for safety in the Agriculture, Technology Education, and Trade & Technical labs.

It is our express hope that the development of this safety program will limit the risk of accidents for students and instructors.

This document should be used by administrators, supervisors and instructors to ensure that the laboratory-based activities and experiences of students will be as risk-free as possible

**Steven O. Laing**  
State Superintendent of Public Instruction

**UTAH STATE BOARD OF EDUCATION  
UTAH STATE BOARD FOR  
APPLIED TECHNOLOGY EDUCATION**

250 East 500 South  
P O Box 144200  
Salt Lake City, UT 84114-4200

**District 1**  
VACANT

**District 6**  
Joyce W. Richards  
930 East 5000 South  
Ogden, UT 84403  
Phone: (801) 479-5370

**District 11**  
David L. Moss  
1964 Hawk Circle  
Sandy, UT 84092  
Phone: (801) 572-6144

**District 2**  
A. Earl McCain  
5762 West Wasatch  
Morgan, UT 84050  
Phone: (801) 876-3282

**District 7**  
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932 Canyon Crest Drive  
Bountiful, UT 84010  
Phone: (801) 292-9261

**District 12**  
Laurel Brown  
5311 So. Lucky Clover Ln.  
Murray, UT 84123  
Phone: (801) 261-4221

**District 3**  
Marilyn Shields  
458 Country Club  
Stansbury Park, UT 84074  
Phone: (435) 882-7137

**District 8**  
John C. Pingree  
1389 Harvard Avenue  
Salt Lake City, UT 84105  
Phone: (801) 582-5635

**District 13**  
Janet A. Cannon  
5256 Holladay Blvd.  
Salt Lake City, UT 84117  
Phone: (801) 272-3516

**District 4**  
Teresa L. Theurer  
66 Canterbury Circle  
Logan, UT 84321  
Phone: (435) 753-0740

**District 9**  
Judy Larson  
5058 West Corilyn Circle  
West Valley City, UT 84120  
Phone: (801) 969-2382

**District 14**  
Mike Anderson  
455 East 200 North  
Lindon, UT 84042  
Phone: (801) 785-1212

**District 5**  
Greg W. Haws  
5841 West 4600 South  
Hooper, UT 84315  
Phone: (801) 985-7980

**District 10**  
Denis R. Morrill  
6024 South 2200 West  
Salt Lake City, UT 84118  
Phone: (801) 969-2334

**District 15**  
Linnea S. Barney  
1965 South Main Street  
Orem, UT 84058  
Phone: (801) 225-4149

**Steven O. Laing**  
Executive Officer

**Twila B. Affleck**  
Secretary

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# **Definition of Safety**

# **Safety is....**

**freedom from danger,  
risks or accidents  
that may result  
in injury,  
death or  
property damage.**

“Every year over 6,000 Americans die from workplace injuries. An estimated 50,000 people die from illnesses caused by workplace chemical exposures and 6,000,000 people suffer non-fatal workplace injuries. Injuries, alone cost the economy more than \$110,000,000 a year.”

**The New OSHA Reinventing Workers Safety and Health**

**January 2000**

# **Important Telephone Numbers**

# Important Telephone Numbers

Please fill in and post these phone numbers appropriate to your local safety and emergency response.

**Emergency . . . . . 911**

**Hospital . . . . . \_\_\_\_\_**

**Utah Poison Control Center . . . . . 1-800-456-7707**

**District Safety Director . . . \_\_\_\_\_**

**Fire . . . . . \_\_\_\_\_**

**School/Inst. Main Office . . \_\_\_\_\_**

# Purpose

# Purpose

To reduce and eliminate accidents in educational shops, labs and the workplace by:

- Making instructors aware of dangers and risks to themselves, students and visitors.
- Providing the instructors with knowledge to be able to make the lab, shop, classroom, or workplace a safe environment.
- Providing recommendations to improve the safe environment for learning or working.
- Providing examples of important records, and forms for evidence of compliance.
- Providing a basic understanding of the educator's legal responsibilities.
- Providing instructors with resources relevant to safety in their programs.

# **Safety and the Law**

# Safety and the Law

1. The risk of a lawsuit is ever-present.
2. Fear of litigation should **NOT** restrict effective, safe teaching and learning. Participatory activities should remain interesting and exploratory.
3. This program is to teach you **RESPONSIBILITY** and forethought.
4. Make safety in the lab a **HABIT** in your teaching career.
5. Knowledge is the key to avoiding potential problems.
6. THE LAW OF NEGLIGENCE REQUIRES THAT A PERSON BE REASONABLE, UNDER THE CIRCUMSTANCE. THAT IS, EXERCISE GOOD **COMMON SENSE**. THIS IS WHAT GOOD SAFETY IS ALL ABOUT.

## THE LAW DEFINED

- **PLAINTIFF** – The party that initiates a lawsuit in court.
- **DEFENDANT** – The party against whom a lawsuit is initiated.
- **STATE COURT** – Consists of a judge and/or jury. Classroom injuries are usually tried in a state trial court.
- **APPELLATE COURT** – Appeals from the state court's decisions.
- **BURDEN OF PROOF** – Rule stating that the plaintiff must prove that damage has been done to him/her by the defendant.
- **NEGLIGENCE** – Conduct which breaches a duty established by law or the profession that causes damage or injury. This is usually a failure to do something that a reasonable person would do to prevent harm.
- **REASONABLE** – Rational and commonsense behavior in view of the potential danger.
- **PRUDENT** – Cautious, discreet, managing very carefully.

# Comparative Negligence

## WHERE DOES THE BLAME LIE?

**CONTRIBUTORY NEGLIGENCE** – Plaintiff can recover damages even if he/she was negligent in some way that contributed to his/her own injury, as long as that negligence does not exceed the defendant's negligence.

**COMPARATIVE NEGLIGENCE** – Plaintiff's and defendant's negligence will be apportioned on a jury verdict form.

Under Utah law all parties' negligence is compared.

## DOCUMENTATION

Notice of Claim in the State of Utah for a minor extends to 1 year following his/her reaching adulthood.

If you have an incident in your classroom, do the following things:

1. Fill out a Student Injury Report Form.
2. Get two (2) students to write down what they saw.
3. Get the STUDENT INVOLVED in the incident to write down what happened and sign the account.
4. Keep a copy in a PERMANENT file.

## RELEASES OR WAIVERS

These are usually not sufficiently detailed, and courts usually construe them in favor of the student whose parent signed for him/her.

**DO NOT RELY** upon releases as a substitute for safety precautions.

# Duties

# Legal Duties of an Instructor

## DUTY TO INSTRUCT

An instructor who does **NOT** instruct properly could place a student in a dangerous situation where the lack of appropriate information might contribute to an accident.

A prudent instructor must **ANTICIPATE** and **EXPLAIN**, proper safety concerning any problems that may arise.

## DUTY OF SUPERVISION

Instructors are responsible for **APPROPRIATE BEHAVIOR** on the student's part.

If one student hurts another it is the instructor who is the responsible adult.

Instructors must teach and maintain **CLASSROOM CONTROL**.

The instructor is **"IN LOCO PARENTIS"** – he/she is the local parent and the responsible adult during the educational experience.

## DUTY TO MAINTAIN

Instructors are responsible for seeing that **EQUIPMENT** is kept in safe working order.

## UNDERLYING REASON AND PRUDENCE

Common sense dictates that if you are doing what you should to protect students, yourself and others while providing a learning experience, then the following statement applies:

It is understood by the court system that an instructor(s) who is doing everything ***reasonable and prudent*** under the given circumstances to supervise students working in a shop environment is doing what he or she should do to maintain a safe learning environment.

**-Michelle Bues, DSD Legal Issues Specialist**

As you, the instructor, ponder your concerns involving facility, hand tools, power tools and equipment that may pose a risk to students, you must take ***reasonable and prudent*** steps to prevent accidents from happening.

## FACILITY, TOOL AND EQUIPMENT CONCERNS

As we know, nothing is 100% safe. A person can be injured by an action as simple as self-impalement with a pencil or tripping down a set of stairs. Do we stop using pencils and stairs, then? Society has provided you a “nod of its head” by realizing that you teach a discipline that is outstanding compared to any other at this level of education. Society **wants** you to give students this experience that no other school discipline can offer. Society **trusts** you to do it, do it well, and do it safely. Therefore, society has provided you a level of flexibility that you should enjoy and employ, but not abuse.

Everything that an instructor is expected to do cannot be written down. Society treats instructors like professionals because they **are** professionals.

**- Michelle Beus, DSD Legal Issues Specialist**

As a professional, it is **reasonable and prudent** that you maintain relatively clean, uncluttered facilities. Properly working tools and equipment, safety signs, posters and floor markings where applicable, safety guards, the wearing of Personal Protective Equipment (PPE), etc., are examples of reasonable and prudent measures to protect all persons in the shop environment. Should there be a facility, tool or equipment concern that you as the **professional** feel does not allow safe education to take place in a reasonable and prudent manner, immediately contact your supervisor to resolve how to bring the article in question back into reasonable and prudent compliance. Also, be fair in developing your paradigm of what reason and prudence entail. Look at the scenario from society’s point of view. The phrase “not everything goes” is critical in the ATE educational environment. That’s part of what makes you a professional.

At present, there is no policy on what equipment can and cannot be used at the junior high (Technology Education) level as outlined by the USOE...but I have a difficult time endorsing junior high school students (up to grade 8) using a table saw, and, in most instances, 9<sup>th</sup> graders (considered high school). When teachers choose to have students of that grade level (9<sup>th</sup>) use that particular piece of machinery, it should be under direct supervision of the teacher and with all manufacturer’s guards in place.

**- Dave Milliken, USOE Trade and Technical Specialist**

Although presently there is not an existing policy that itemizes a list of what can and cannot be used to educate students in the junior high shops, please conceptualize what a reasonable and prudent person would think a student at this age should be experiencing in this environment.

# PERSONAL AND STUDENT TRAINING, EDUCATION AND PREPAREDNESS

It is crucial that you, as a professional, obtain and keep current your credentials and training so that you, in turn, may provide your students with a quality, safe learning experience. The ***Professional Educator License for the State of Utah*** identifies your level of training, license areas of training, experience status and endorsements. It is ***your responsibility*** to obtain the necessary training, experience, degree, etc., to obtain/maintain valid credentials as recognized by the USOE and society as a whole that you are licensed to teach Applied Technology Education in the state of Utah. It is reasonable and prudent that you be appropriately licensed.

Unlicensed and unendorsed instructors with assignments involving Applied Technology Education classes are REQUIRED by state law to begin the process of endorsement by meeting with the USOE Applied Technology Education Specialist to personalize a plan that would identify the experience and education necessary to satisfy the requirements for a ***Professional Educator License for the State of Utah***. Until this plan is established and outlined, such instructors should NOT operate tools, equipment and machinery, nor allow their students to do so. Since each unlicensed and/or unendorsed individual possesses a different history of training and experience, the USOE Applied Technology Education Specialist will make reasonable and prudent accommodations and place requirements and limitations on the individual instructor that will eventually satisfy the demands of the necessary license/endorsement sought after, while still authorizing the teaching of ATE.

It is reasonable and prudent for a professional instructor to provide all students with adequate safety training. This should include, but is not limited to, safety demonstrations, safety videos, the proper and adequate wearing of Personal Protective Equipment (PPE), safety quizzes and tests, etc. It is also reasonable and prudent to require that the student demonstrate proficiency in facility, tool and equipment safety to the instructor, who uses his or her professional assessment in allowing the student to utilize shop facilities.

Consider the following:

Your deeds, not your words, speak to me.

- John Fletcher

Training by example is of utmost importance. A reasonable and prudent instructor will adhere to the same guidelines that he or she, as a professional, imposes upon his or her students. Impressionable minds are quick to see the level of dedication or lack thereof in their instructor. It is imperative that you personify the example of safe and enjoyable learning.

## **PRESENT JUDICIARY SUPPORT, DIRECTION AND DEFINITION**

We, as a society, have always recognized the need for applied technology education. Society as a whole, then, is given the burden of finding, training and otherwise supporting those whom society chooses to teach this valuable content area. You are the professional who has accepted the charge from society to do just that. Society trusts you to do it, to do it well and do it safely.

# Managing Risk

# Managing Risk

- Teachers are responsible for seeing that equipment in the lab is kept in safe operating condition.
- Teachers are responsible for providing instruction and demonstrating safe and proper operation procedures for each piece of power equipment, portable power hand tools, and other hand tools, as well as cleaning and/or finishing procedures. (See Safety Inspection Check List Items on pp. 27-37)
- Teachers must plan ahead and be aware of potential dangers and problems.
- Teachers must have and maintain order and control in the classroom and/or lab.
- Teachers must teach a proper degree of respect for the dangers that are inherent in the lab or shop.
- Teachers should **never** leave students unattended.
- Teachers cannot delegate the responsibility for a class to a student (TA).
- Students should receive a copy of the safety rules for each piece of equipment prior to use.
- Student must pass a general shop safety test with a score of one hundred percent (100%).
- The teacher should keep safety test scores until the student is twenty-one (21) years old. (A sample of the safety test shall be available upon request.)
- Students need to sign a document (such as a parent awareness/permission form) saying that they will not use any equipment until they have observed a demonstration on that piece of equipment, received a copy of the safety rules, passed a safety test at 100%, and received the instructor's permission.
- Parents should sign a parent awareness/permission form before the student uses any equipment. (See example in Appendix B.)
- Do not underestimate the seriousness of an accident.
- After the pressure of an accident has subsided, fill out a Student Injury Report Form. (See example in Appendix B.)
- Keep a copy of accident records.
- ATE directors, administrators, principals, counselors and teachers must be reasonable and prudent in seeing that classes are not overloaded.

# Applied Technology Education Program Standards

The standards serve as a basis for curriculum, instruction, equipment and facilities for an approved ATE program. The standards indicate the requirements for a safety program that conforms to state and federal laws as applied to each approved program in Agriculture Education, Technology Education, and Trade and Technical Education.

**Instruction:** Curriculum and instruction must be directly related to business and industry, state or local advisory committees, validated competencies, and task lists. Instruction is outcome-based, and verification of competence is determined by mastery of a business/industry-validated criterion-referenced test. Task lists and criterion tests shall be developed and provided by the USOE. Instruction in proper and safe use of any equipment required for mastery and competency shall be provided within the approved program.

**Tools, Equipment and Facilities:** Tools, equipment and facilities, consistent with the validated task lists identified in the instruction standard, shall be provided and maintained in a manner that meets safety requirements and applicable state and federal laws.

**Instructional Staff:** Counselors must be certificated in accordance with state certification requirements. Instructional staff must hold a valid Utah Professional Educator License with endorsements appropriate for the programs they teach. ATE program instructors must keep technical and professional skills current through business/industry advisory committee involvement in order to ensure that students are provided accurate and safe state-of-the-art information.

**Program Advisory Committee:** Each state-approved ATE program must be supported at the Local Education Agency (LEA) level by a program advisory committee made up of individuals who are working in the occupational area the program teaches. Small rural districts may apply for a waiver to this committee requirement.

# Safety Awareness

## GENERAL HAND AND POWER TOOL SAFETY RECOMMENDATIONS

Objective: The student will be able to understand rules of safety and demonstrate safe practices while using hand and power tools.

- **Instructor Demonstrations:** Students should attentively watch *all* demonstrations given on proper hand and power tools use, maintenance and storage; first aid station locations; etc., and be tested on such critical information.
- **Personal Protective Equipment (PPE):** Student should be informed of any and all PPE requirements for using specific hand and power tools (such as Z87.1-approved eye protections, steel-toed shoes, gloves, properly shaded welding helmets, OSHA-approved hard hats, proper hearing protection, tucked-in or rolled-up clothing, tied-back hair, removal of jewelry, etc.) as the situation requires.
- **Cleanliness Reduces Accidents:** Dirty, cluttered and oily tools and work areas can cause accidents. Students should clean and put away unneeded tools and materials and maintain a large enough workspace for the job being done. Students should unplug and properly store power tools when not in use and avoid using power tools in damp or wet areas. They should also work in a sufficiently lit workspace and keep paths to exits clear.
- **Proper Tool Usage:** Instructors should always inspect hand and power tools before authorizing students to use them. Electrical tools *must* also protect the user from electrical shock by providing “double insulated,” grounded and/or Ground Fault Circuit Interrupter (GFCI) protection. Damaged or broken hand or power tools should *not* be used. Students should always use tools only for the job for which they were intended. Forcing a small tool to do a job meant for a large one, dulled tools, tools in disrepair, broken or missing power tool guards, exposed electrical wiring or power tools, striking hand tools not meant to be hit, carrying sharp tools in pockets or with tips pointed in a direction other than straight down, etc., are some examples of hand and power tool misuse.
- **Secure Workpiece:** Students should use a vice or clamps to secure small projects that are too difficult or dangerous to hold by hand.

# Space Recommendations Per Student

## SPACE RECOMMENDATIONS FOR LABS AND CLASSROOMS

Generally, more square footage is required as the amount of stationary equipment is increased.

### Square Feet Per Student

50 to 75	labs with limited equipment (modular tech lab)
75 to 150	labs with increased stationary equipment use (materials processing)

To determine the space requirements use the following formula:

# Student x Requirement = Total square footage requirement (not counting storage).  
Plus 10 to 20% additional space for storage.

### Example:

Modular technology lab for 24 students

$24 \times 75 = 1,800 + 180 = 1,980$  sq. ft. – Recommended 2,000 sq. ft. \*\*

\*\*There could be additional requirements for lab program-specific training areas.

# **Elements of Ergonomics Program**

A Primer Based on Workcenter Evaluations of Musculoskeletal Disorders

# **Safety Check List**

**This check list will provide you  
as a teacher or administrator  
with an evaluation tool  
that will help you measure  
the effectiveness  
of your safety program.**

# Safety Inspection Check List

School \_\_\_\_\_

Facility \_\_\_\_\_

Instructor \_\_\_\_\_

Inspection Date \_\_\_\_\_

## INSPECTING TEAM

Instructor \_\_\_\_\_

Administrator \_\_\_\_\_

Other Member \_\_\_\_\_

## INSTRUCTIONS

- A minimum of one safety inspection should be completed before students are allowed to use equipment or tools in the facility.
- One safety inspection should be completed while students are actively using tools and equipment to meet curriculum goals.
- Previous inspection reports should be compared with current reports to determine progress toward safety goal.
- Unsatisfactory responses and unsafe conditions must be corrected in accordance with local procedures before students are allowed to use the tools and equipment in the facility.
- Respond to all items by drawing a circle around the appropriate letters using the following codes:
  - \* S means “satisfactory” (no action needed)
  - \* U means “unsatisfactory” (requires immediate attention)
  - \* NA means “not applicable”
- Recommendations for each “U” circled should be made in the space provided at the end of the safety inspections reports. Code the recommendations with the same designation used to identify the checklist item.

# Safety Check List Items

Respond to all items by drawing a circle around the appropriate letter using the following codes:

S – Satisfactory    U – Unsatisfactory    NA – Not Applicable

Item	A. School Administration	Circle One
<b>A-1</b>	The agency administrator is a participating member of the safety inspection team.	S   U   NA
<b>A-2</b>	The agency administrator visits the facility to assure that hazardous conditions are corrected.	S   U   NA
<b>A-3</b>	The agency administrator reviews curriculum materials and lesson plans to assure that a planned and organized instructional program is offered.	S   U   NA
<b>A-4</b>	The agency administrator requires that standardized written reports on hazardous conditions be submitted and distributed to the proper individuals to ensure corrective action.	S   U   NA
<b>A-5</b>	The agency administrator keeps records of all safety inspections available for reference.	S   U   NA
<b>A-6</b>	A written procedure is used for reporting defective equipment to ensure prompt repair.	S   U   NA
<b>A-7</b>	Accidents are promptly reported to the administration safety director. Accidents are analyzed and immediate steps are taken to correct the cause of accidents.	S   U   NA
<b>A-8</b>	The agency has necessary information readily available to contact parents or guardians.	S   U   NA
<b>A-9</b>	The school has an effective policy and procedure to follow in case of accidents, and teachers have been trained on policy and procedures.	S   U   NA
<b>A-10</b>	The school has an effective policy and procedure for the administration of first aid.	S   U   NA
<b>A-11</b>	The agency administrator accepts the responsibility for keeping class sizes appropriate for activities.	S   U   NA
<b>A-12</b>	The agency administrator is aware of his or her responsibility with regard to student and staff protection.	S   U   NA
<b>A-13</b>	The agency administrator requires that this facility be maintained, cleaned and provided with the same custodial services as other programs on this campus	S   U   NA
<b>A-14</b>	The administrator ensures that a State of Utah-certified instructor is in attendance when students are assigned to work with tools and equipment.	S   U   NA

## Safety Check List Items (continued)

Respond to all items by drawing a circle around the appropriate letter using the following codes:

S – Satisfactory    U – Unsatisfactory    NA – Not Applicable

Item	B. Instructor	Circle One
B-1	The instructor supervises students at all times that class is in session.	S U NA
B-2	The instructor inspects the facility on a scheduled basis to identify needed repair.	S U NA
B-3	The instructor reports all hazardous conditions in writing to the proper administrator.	S U NA
B-4	The instructor keeps records of all inspections for reference.	S U NA
B-5	The instructor keeps records of all maintenance problems and disposition of requests for corrections.	S U NA
B-6	The instructor keeps records of all accidents and analyzes them immediately for corrective measures.	S U NA
B-7	The instructor is knowledgeable in first aid and deemed qualified by the administrator to act in case of emergency.	S U NA
B-8	The instructor selects student activities and operations that will match the age maturation level and ability of the students involved.	S U NA
B-9	Instructor-owned tools are not used by the students.	S U NA
B-10	The instructor insists that students wear proper eye protection and other necessary protective equipment and/or clothing.	S U NA
B-11	The instructor demonstrates and maintains proper procedures, eye protection, attitude and work habits.	S U NA
B-12	The instructor is knowledgeable in the location and use of fire extinguishers.	S U NA
B-13	The instructor is able to turn off the main power switches when class is not in session.	S U NA
B-14	The lock-out/tag-out program has been established.	S U NA
B-15	A system for handling hot materials has been established.	S U NA
B-16	Routine preventative maintenance is scheduled and completed for this facility.	S U NA
B-17	Personal protective equipment is sterilized before being interchanged with other students.	S U NA

## Safety Check List Items (continued)

Respond to all items by drawing a circle around the appropriate letter using the following codes:

S – Satisfactory    U – Unsatisfactory    NA – Not Applicable

Item	C. Instruction	Circle One
C-1	Students satisfactorily demonstrate proper procedure, supervised by the instructor, for using tools and power equipment in the facility after passing written safety tests.	S U NA
C-2	Hazardous operations are identified and safety requirements are emphasized for better student understanding	S U NA
C-3	"Horseplay" and practical jokes are considered dangerous and are not allowed.	S U NA
C-4	Special instructions are given in the use and handling of hazardous materials and chemicals such as toxins, caustics, and volatile materials or chemicals.	S U NA
C-5	Instruction is given in the proper methods of handling and lifting materials.	S U NA
C-6	Students demonstrate the understanding that they will not leave a machine running, or approach an operator in a manner that could annoy or alarm the operator.	S U NA
C-7	Students' learning activities are approved by the instructor before work begins.	S U NA
C-8	Materials being worked with are safely secured.	S U NA
C-9	Safety bulletin boards, posters, student reports are part of the total safety program.	S U NA
C-10	The instructor assumes responsibility for staying informed about agency safety policies and procedures.	S U NA
C-11	The instructor is trained in MSDS use, location and importance.	S U NA
C-12	Students are instructed about the dangers of approaching other students operating tools or equipment in a manner that could annoy or alarm the operator.	S U NA

## Safety Check List Items (continued)

Respond to all items by drawing a circle around the appropriate letter using the following codes:

S – Satisfactory    U – Unsatisfactory    NA – Not Applicable

Item	D. Personal Protection	Circle One
D-1	Safety glasses, shields, or eye goggles are worn in accordance with state laws.	S   U   NA
D-2	Eye-wash baths and showers are available when using caustic materials.	S   U   NA
D-3	After use, eye protective devices are disinfected and returned to properly designed storage.	S   U   NA
D-4	In areas where special body-protective clothing is needed, such clothing is provided and used.	S   U   NA
D-5	Wearing of loose clothing, jewelry, ties, etc., or dangling long hair does not occur in the shop.	S   U   NA
D-6	Injuries are reported to the instructor for immediate attention.	S   U   NA

## Safety Check List Items (continued)

Respond to all items by drawing a circle around the appropriate letter using the following codes:

S – Satisfactory    U – Unsatisfactory    NA – Not Applicable

Item	E. General Facility	Circle One
E-1	One instructor has the responsibility for each facility.	S U NA
E-2	Each facility can be locked separately.	S U NA
E-3	Storage is provided to keep garments and other personal materials out of the work area.	S U NA
E-4	The facility is neat, orderly, and kept clean.	S U NA
E-5	Materials not used for instruction are not stored in the facility.	S U NA
E-6	Students are responsible for removing waste materials after each class session.	S U NA
E-7	Floors are maintained in a condition conducive to safe practices, with non-skid surfaces especially around machines.	S U NA
E-8	Waste (e.g., shavings, sawdust, paint and oil rags) is collected daily and disposed of properly.	S U NA
E-9	Designated safety zones are provided around dangerous work areas.	S U NA
E-10	Aisles are kept clear of protruding materials.	S U NA
E-11	Room furniture and equipment are arranged for optimum safety.	S U NA
E-12	Non-glare and proper foot-candle lighting are provided for all work areas.	S U NA
E-13	Stairways within the facility have safe tread and rise with unobstructed access and with approved railings.	S U NA
E-14	Two widely separate marked exits are available from each facility.	S U NA
E-15	Machine operation regulations and safety procedures are posted near the areas of operation.	S U NA
E-16	Parts of machines and equipment needing special attention or caution are painted brightly with recommended color code.	S U NA
E-17	Machines and workstations are located in relationship to the amount of supervision required.	S U NA
E-18	Machine location has been determined by needed operator space and process requirements.	S U NA
E-19	Color code is used to designate caution, hazards, traffic and machine operations.	S U NA
E-20	A hearing conservation program is established.	S U NA
E-21	Cutters, knives and blades are kept sharp.	S U NA

### Safety Check List Items (continued)

Respond to all items by drawing a circle around the appropriate letter using the following codes:

S – Satisfactory    U – Unsatisfactory    NA – Not Applicable

Item	F. Storage	Circle One
F-1	Storage racks and shelves are designed and constructed to safely contain the materials stored.	S   U   NA
F-2	Materials are securely stored and do not protrude into passageways.	S   U   NA
F-3	Flammable and combustible liquids, toxins and caustics are stored in accordance with National Fire Protection Association (NFPA) standards.	S   U   NA
F-4	Fire-approved cabinets are provided for flammable and combustible materials.	S   U   NA
F-5	Waste materials are disposed of in a safe manner consistent with environmental protection and manufacturers' directions.	S   U   NA
F-6	An accessible MSDS file is maintained in the shop for all hazardous materials and chemicals.	S   U   NA

## Safety Check List Items (continued)

Respond to all items by drawing a circle around the appropriate letter using the following codes:

S – Satisfactory    U – Unsatisfactory    NA – Not Applicable

Item	G. Electrical	Circle One
<b>G-1</b>	Power wiring is installed and maintained in accordance with national electrical code, and:	<b>S   U   NA</b>
<b>G-1a</b>	Switches are enclosed.	<b>S   U   NA</b>
<b>G-1b</b>	Circuits are identified, at panel.	<b>S   U   NA</b>
<b>G-1c</b>	Power cords are proper size and length.	<b>S   U   NA</b>
<b>G-1d</b>	Power supplies are provided with UL-approved overload protection.	<b>S   U   NA</b>
<b>G-1e</b>	Lockouts are provided.	<b>S   U   NA</b>
<b>G-2</b>	Outlets and machines are grounded.	<b>S   U   NA</b>
<b>G-3</b>	Extension cords are heavy-duty, three-wire grounded cords and plugs, except for double insulated items.	<b>S   U   NA</b>
<b>G-4</b>	Portable power tools are provided with three-wire grounded cords and plugs, except for double insulated items.	<b>S   U   NA</b>
<b>G-5</b>	Accessible individual “off” and “on” controls are installed on all machines as well as power control panels.	<b>S   U   NA</b>
<b>G-6</b>	Magnetic start/stop switches are installed on machines so that they must be manually reset after electrical power line interruption.	<b>S   U   NA</b>
<b>G-7</b>	A master control switch that can also be controlled by a panic button is located in the facility.	<b>S   U   NA</b>
<b>G-8</b>	Power distribution panels have clearly identified circuit breaker devices for each machine.	<b>S   U   NA</b>
<b>G-9</b>	Extension cords are not used for permanent installation.	<b>S   U   NA</b>
<b>G-10</b>	Portable power tools are equipped with “dead man” controls.	<b>S   U   NA</b>

## Safety Check List Items (continued)

Respond to all items by drawing a circle around the appropriate letter using the following codes:

S – Satisfactory    U – Unsatisfactory    NA – Not Applicable

Item	H. Equipment	Circle One
H-1	Instructions for safe use of machines are posted near each machine.	S U NA
H-2	Machines are maintained in safe operating condition.	S U NA
H-3	“Out-of-order” signs are secured to machines not in working order and power has been removed by locking out the power.	S U NA
H-4	Machines are stabilized to provide safe operations.	S U NA
H-5	Machines are provided with quality safety guards that are in proper operating condition. Verify each of the following:	S U NA
H-5a	Squaring shear finger guard.	S U NA
H-5b	Foot treadle stops above floor on shear.	S U NA
H-5c	Jointer knife guards, left and right.	S U NA
H-5d	Abrasive wheel eye safety shields.	S U NA
H-5e	Abrasive wheel guards and tool rests.	S U NA
H-5f	Table saw guard and anti-kickback device.	S U NA
H-5g	Radial saw guard.	S U NA
H-5h	Radial saw guard forward stop and positive stop return.	S U NA
H-5i	Machine belt and pulley guards.	S U NA
H-5j	Air compressor belt guards.	S U NA
H-6	Equipment control switches are readily accessible to the operator.	S U NA
H-7	A positive “off” switch is located near each machine.	S U NA
H-8	Proper supplies are available for cleaning machines.	S U NA
H-9	Hand tool equipment is stored with sharp cutting edges protected.	S U NA
H-10	Hand tools are properly maintained and kept sharp.	S U NA
H-11	Bench tops are appropriate for the planned activities (e.g. electrical work is done on non-conductive surfaces).	S U NA
H-12	Compressed air is not used for cleaning purposes until it has been reduced to less than 30 psi, and is never used on the body.	S U NA

### Safety Check List Items (continued)

Respond to all items by drawing a circle around the appropriate letter using the following codes:

S – Satisfactory    U – Unsatisfactory    NA – Not Applicable

Item	I. Fire	Circle One
I-1	Only UL-approved equipment is used.	S U NA
I-2	Fire extinguishers are of the proper number and type, and are inspected, dated and recharged according to schedule.	S U NA
I-3	The area behind fire extinguishers is color-coded.	S U NA
I-4	Adequate exit doors and open aisles are available for prompt evacuation.	S U NA
I-5	Fire-approved (UL-FM) storage and waste containers are readily accessible, used, and emptied daily.	S U NA
I-6	Sander bags are emptied daily before the facility is closed.	S U NA
I-7	Finish and spray room doors swing out and cannot be locked from the inside.	S U NA
I-8	Proper respirators and eye protection are used when spraying or applying finishes.	S U NA
I-9	All sprayers, tanks, and containers are grounded.	S U NA
I-10	Filters in spray booths are replaced regularly.	S U NA
I-11	Clean air of sufficient volume is provided to replace air exhausted during spraying.	S U NA

# Safety Inspection Check List

School \_\_\_\_\_ Facility \_\_\_\_\_

Instructor \_\_\_\_\_ Inspection Date \_\_\_\_\_

The items listed were found to be in violation of acceptable safety standards and must be corrected before students are allowed to use the facility or equipment cited.

Ref. Number	Item Number	Action Required	Date Corrected
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			
18			

# Appendices

# **Eye Safety**

## **Appendix A**

# Utah Code Section 53A-13-103

53A-13-103. Eye protective devices for industrial education, physics laboratory, and chemistry laboratory activities.

- (1) Any individual who participates in any of the following activities in public or private schools that may endanger his vision shall wear quality eye protective devices:
  - (a) industrial education activities that involve:
    - i. hot molten metals;
    - ii. the operation of equipment that could throw particles of foreign matter into the eyes;
    - iii. heating treating, tempering, or kiln firing of any industrial materials;
    - iv. gas or electric arc welding; or
    - v. caustic or explosive materials;
  - (b) chemistry or physics laboratories when using caustic or explosive chemicals, and hot liquids and solids.
- (2) "Quality eye protective devices" means devices that meet the standards of the American Safety Code for Head, Eye, and Respiratory Protection, Z2.1-1959, promulgated by the American Standard Association, Inc.
- (3)
  - (a) The local school board shall furnish these protective devices to individuals involved in these activities.
  - (b) The board may sell these protective devices at cost or rent or loan them to individuals involved in these activities.

**Enacted by Chapter 2, 1988 General Session**

**Web Site Reference:**

<http://www.le.state.ut.us/~code/TITLE53A/htm/53A0E010.htm>

# **Additional Eye Protection Information**

## **LENSES**

Phototropic (photochromic) lenses change depth of tint when exposed to varying degrees of ultraviolet light – that is, they darken when exposed to sunlight and fade when removed from the sunlight. These lenses do comply with current ANSI Z87.1 standards, with limitations.

Photochromic lenses have limitations in operations requiring critical visual acuity or fast reaction to visual stimuli, particularly in operations where the wearer passes from outdoors to indoors in the course of his work activity. Also, these types of lenses should not be used as a substitute for the proper protection in hazardous optical radiation environments (for example, certain laboratory and shop operations, such as welding or foundry work).

If an individual must wear tinted lenses, as prescribed by an eye specialist, industrial-quality eye and face protection devices appropriate for the hazard involved should also be worn.

## **POST OF EYE-HAZARDOUS AREAS**

At the entrance to all shops, laboratories or other areas which require industrial-quality eye protection should be posted a sign indicating the requirements. In addition, machines, equipment or process areas and laboratories requiring operators to wear specific eye and face protection should be posted with warning signs.

Visitors must wear the protective devices that are required in the area. Extra devices should be available at all times to lend to visitors.

## **FITTING AND MAINTENANCE**

Safety eyewear must be fitted properly. It should be the responsibility of the person in charge of dispensing safety glasses or goggles to see that properly fitted and adjusted eyewear is provided for each individual.

Lenses of eye protectors must be kept clean. Restricted vision due to dirty lenses is sometimes a contributing factor in accidents. Eye protective devices that are shared shall be disinfected between uses.

## **CLEANING AND DISINFECTING PROCEDURES**

The following cleaning procedures are recommended in the ANSI Z87.1. Products shall be cleaned according to the manufacturer's instructions. If none are available, clean with mild soap and warm water solution by soaking the device in the soap solution maintained at 120° F for ten minutes. Rinse thoroughly and allow to air-dry.

To disinfect, completely immerse the protector for ten minutes in a solution of modified phenol, hypochlorite, quaternary ammonium compound or other disinfection reagent, in a strength specified by the manufacturer of the protective equipment, at room temperature of 20° C (68° F).

Remove protector from solution and suspend in a clean dry place for air-drying at room temperature or with heated air. Do not rinse because this will remove the residual effect of the disinfectant.

Ultraviolet disinfecting equipment may be utilized in conjunction with the preceding washing procedure when such equipment can be demonstrated to provide comparable disinfection.

Spray-type disinfection solutions and bactericides may be utilized when such pressurized spray solutions can be demonstrated to provide comparable disinfection with the immersion procedure outlined above. Store dry devices in a clean, dustproof container or area.

Protectors showing the need for extensive cleaning should be disassembled to the extent possible without tools prior to the washing and disinfection procedure.

## **INSPECTION OF PROTECTORS**

Instructors and students should make a visual inspection of their protectors prior to use. Protective devices with broken parts, heat distortion, or excessive scratches on the lens are unsuitable for use and should not be worn. Pitted and scratched lenses may reduce vision and also, along with worn-out headbands, seriously reduce protection. Replace defective parts with new ones.

# Eye Protective Devices

The illustrations shown are only representative of protective devices commonly available at the time of the writing of this standard. Protective devices do not need to take the form shown, but must meet the requirements of the standard.

## NOTES

1. Care shall be taken to recognize the possibility of simultaneous exposures to a variety of hazards. Adequate protection against the highest level of each of the hazards must be provided.
2. Operations involving heat may also involve optical radiation. Protection from both hazards shall be provided.
3. Face shields shall only be worn over primary eye protection.
4. Filter lenses shall meet the requirements for shade designations.
5. Persons whose vision requires the use of prescription (Rx) lenses shall wear either protective devices fitted with prescription (Rx) lenses or protective devices designed to be worn over regular prescription (Rx) eyewear.
6. Wearers of contact lenses shall also be required to wear appropriate covering eye and face protection devices in a hazardous environment. It should be recognized that dusty and/or chemical environments may represent an additional hazard to contact lens wearers.
7. Caution should be exercised in the use of metal frames protective devices in electrical hazard areas.

8. Welding helmets or face shields shall be used only over primary eye protection.
9. Non-sides shield spectacles are available for frontal protection only.

Reprinted from American National Standard Practice for Occupational and Educational Eye and Face Protection, ANSI Z87.1-1989, approved by the American National Standards Institute of February 2, 1989 and published by the American Society of Safety Engineers as the Secretariat of the Standards Project.

**American National Standard Z87.1-1989**

# **Sample Forms**

## **Appendix B**

**These forms are for your use  
when applicable. Please feel free  
to make copies.**

**The Student Injury Report Form  
is a Three-Part NCR form  
and should be obtained  
from your administrative offices.**

**UTAH DEPARTMENT OF HEALTH  
DIVISION OF FAMILY HEALTH SERVICES  
STUDENT INJURY REPORT FORM**

This form is to be completed immediately following the occurrence of any injury that is severe enough to: (a) cause the loss of one-half day or more of school, (b) warrant medical attention and treatment (i.e. school nurse, M.D., E.R., etc.) and/or (c) require reporting according to School District policy. *Additional instructions on back.*

1. Child's Name \_\_\_\_\_ 5. Date of Birth \_\_\_\_/\_\_\_\_/\_\_\_\_ mo day yr 8. Date of injury \_\_\_\_/\_\_\_\_/\_\_\_\_ mo day yr  
 2. Parents Name \_\_\_\_\_  
 3. District Name \_\_\_\_\_ 6. Grade \_\_\_\_\_ 9. ( ) Male ( ) Female  
 4. School Name \_\_\_\_\_ 7. Time of Injury \_\_\_\_\_ ( ) am ( ) pm 10. Fatal ( ) Yes ( ) No

11. **DAYS ABSENT:** Record letter of DAYS absent from school related to this injury in box at left.

a) Less than 1/2     b) 1/2     c) 1     d) 1 1/2 - 2     e) 2 1/2 - 3     f) If more than 3 days, the specify # \_\_\_\_\_

12. **ACTION TAKEN:** PLEASE CHECK AND COMPLETE ALL THAT APPLY.

1. <input type="checkbox"/> First Aid administered _____ ( ) am _____ ( ) pm 2. <input type="checkbox"/> Parent or guardian notified _____ ( ) am _____ ( ) pm 3. <input type="checkbox"/> Unable to contact parent/guardian _____ ( ) am _____ ( ) pm 4. <input type="checkbox"/> Remained in or returned to class 5. <input type="checkbox"/> Sent/taken home 6. <input type="checkbox"/> Parents deemed no medical action necessary 7. <input type="checkbox"/> Checked by school nurse 8. <input type="checkbox"/> Checked by EMT on staff 9. <input type="checkbox"/> Called 911	TIME: _____ BY WHOM: (List title code) (Title codes on back) _____ Specify name _____ _____ Specify name _____
10. <input type="checkbox"/> Taken to M.D., health care provider, hospital, etc. Diagnosis: _____ 11. <input type="checkbox"/> Hospitalized Specify length: _____ 12. <input type="checkbox"/> Restricted school activity Specify length: _____ 13. <input type="checkbox"/> Other-Specify _____	

13. **NATURE OF INJURY:** List the injuries/symptoms incurred. (Record # in boxes at left)

<input type="checkbox"/> More severe	1. Abrasion/Scrap 2. Bump/Bruise/Contusion 3. Burn/Scald 4. Concussion (possible)	5. Cut/Laceration 6. Dislocation (possible) 7. Fracture/Broken (possible) 8. Loss of Consciousness	9. No Pulse 10. Not Breathing 11. Pain/Tenderness Only 12. Puncture	13. Shortness of Breath 14. Sprain/Strain/Tear 15. Swelling/Inflammation 16. Other
<input type="checkbox"/> Less severe				

14. **NATURE OF INJURY:** List area affected for each injury/symptom code listed in 13 above. (Record # in boxes at left.)

	<b>HEAD</b>	<b>TRUNK</b>	<b>EXTREMITIES</b>
<input type="checkbox"/> More severe	1. Chin/Cheek 2. Ear 3. Eye 4. Forehead 5. Mouth/Tongue/Lip	6. Neck/Throat 7. Nose 8. Head 9. Tooth/Teeth	10. Stomach 11. Back 12. Buttocks 13. Chest/Ribs 14. Collarbone
<input type="checkbox"/> Less severe			15. Genitalia 16. Internal 17. Pelvis/Hip 18. Shoulder 19. Ankle 20. Arm 21. Elbow 22. Finger/Thumb 23. Foot
			24. Hand/Wrist 25. Knee 26. Leg 27. Toe

15. **CONTRIBUTING FACTOR:** List factor which may have led to the injury. (Record # in boxes at left)

<input type="checkbox"/>	1. Animal Bite (dog bite, etc.) 2. Collision with object or person 3. Compression/Pinch 4. Contact with equipment (shop, home, etc.)	5. Contact with fire, hot liquid or hot object 6. Drug, alcohol or other substance 7. Fall 8. Foreign body/object	9. Hit with thrown object 10. Overexertion/Twisted 11. Seizure disorder 12. Tripped/Slipped	13. Unknown 14. Weapon (gun, knife, etc.) Specify 15. Other
--------------------------	---	--	--	--

16. **PERIOD:** List period during which injury occurred. (Record # in box at left.)

<input type="checkbox"/>	1. After School 2. Assembly 3. Athletic event (team competition)	4. Athletic practice session 5. Before school 6. Class change	7. Class time (exclude PE) 8. Field trip 9. Intramural competition	10. Lunch 11. Lunch recess 12. Recess	13. PE class 14. Other
--------------------------	--	---	--	---	---------------------------

17. **SURFACE:** List surface on which injury occurred. (Record # in box at left.)

<input type="checkbox"/>	1. Blacktop 2. Carpet 3. Concrete	4. Dirt 5. Gravel 6. Ice/Snow	7. Lawn/Grass 8. Mats 9. Sand	10. Synthetic surface (i.e. Tartan surface) 11. Tile	12. Wood (waxed) 13. Other _____ 14. Fiber
--------------------------	---	-------------------------------------	-------------------------------------	---	--

18. **LOCATION:** List location at which injury occurred. (Record # in box at left.)

<input type="checkbox"/>	1. Athletic field 2. Auditorium 3. Bus loading area 4. Classroom	5. Corridor 6. Doorway 7. Gymnasium 8. Lab (Home Ec., Chem, etc.)	9. Lunchroom/Kitchen 10. Playground/Playfield 11. School bus/Public bus 12. Shop (Indust. Arts, etc.)	13. Sidewalk/Stairs/Ramp 14. Street/Driveway/Parking Area 15. Restroom/Lavatory 16. Other _____
--------------------------	---	--	--	--

19. **ACTIVITY:** List activity during which injury occurred. (Record # in box at left.)

<input type="checkbox"/>	1. Baseball/Softball 2. Basketball 3. Bicycling 4. Classroom activity 5. Climbing 6. Dodge ball/War ball	7. Fighting 8. Flat/Touch football 9. Football 10. Gymnastics/Tumbling 11. Jumping 12. Kickball	13. Playing on bars (monkey bars/big toy/etc.) 14. Riding 15. Running 16. Roughhousing 17. Setting up/Moving equipment	18. Sliding 19. Sliding on ice 20. Sitting 21. Soccer 22. Standing 23. Swinging	24. Throwing rocks or snowballs 25. Track & field 26. Volleyball 27. Walking 28. Wrestling 29. Other _____
--------------------------	---	--	--	--	---

20. **EQUIPMENT:** Was equipment or apparatus involved in injury?  Yes  No    **IF YES,** (a) Did equipment appear to be used appropriately?  Yes  No  
 Specify equipment \_\_\_\_\_ (b) Was there any apparent malfunction of equipment?  Yes  No

21. **DESCRIPTION:** \_\_\_\_\_

22. \_\_\_\_\_ Title Code \_\_\_\_\_ 27. \_\_\_\_\_

# Parent Awareness/Permission Form

\_\_\_\_\_ has our/my permission to operate the  
(student name)

equipment in the \_\_\_\_\_ shop/laboratory at

\_\_\_\_\_ School. It is understood that instruction in safe operation  
will be given before he/she is allowed to use any piece of equipment and that he/she will be  
properly supervised at all times.

In case of accident, it is preferred that he/she be given treatment by:

Dr. \_\_\_\_\_

or Dr. \_\_\_\_\_

Our home phone number is: \_\_\_\_\_

Father's work phone number is: \_\_\_\_\_

Mother's work phone number is: \_\_\_\_\_

If neither parent can be reached at the above numbers, please notify:

\_\_\_\_\_ at \_\_\_\_\_  
(responsible person) (phone number)

Date: \_\_\_\_\_ Signed: \_\_\_\_\_  
(parent or guardian)

\_\_\_\_\_  
(other: specify relationship)

# Statement of Acknowledgment

This is to certify that I have received safety instructions in/on the following:

\_\_\_\_\_.

My instructor has demonstrated to me how to operate each machine correctly and safely. I have also successfully passed the Equipment Safety Test. I promise to observe all safety precautions, and if ever in doubt regarding any operation, I will consult my instructor and obtain the necessary information.

Signed: \_\_\_\_\_

Date: \_\_\_\_\_

# Vehicle Release Form

Date: \_\_\_\_\_

To Whom It May Concern:

I, \_\_\_\_\_ hereby release the \_\_\_\_\_ School from  
(student)

responsibility and risk for my transportation to \_\_\_\_\_ for the purpose  
(destination)

of \_\_\_\_\_ and return to \_\_\_\_\_ School or to my home.  
(activity)

Date(s) of travel, activity and return:

From \_\_\_\_\_ , \_\_\_\_\_  
(day) (time)

To \_\_\_\_\_ , \_\_\_\_\_  
(day) (time)

Signed: \_\_\_\_\_

---

## STATEMENT TO PARENT OR GUARDIAN

I hereby consent to the above release and activity for \_\_\_\_\_  
(student)

who is my son/daughter.

Signed: \_\_\_\_\_  
(parent/guardian)

---

## NOTE OF SPONSOR OF ACTIVITY

\_\_\_\_\_ is participating in \_\_\_\_\_ on \_\_\_\_\_,  
(student) (activity) (date)

at \_\_\_\_\_, which is sponsored by \_\_\_\_\_.  
(location)

Transportation is by \_\_\_\_\_

Signed: \_\_\_\_\_  
(principal)

# Student Safety Performance Record

School: \_\_\_\_\_ Teacher: \_\_\_\_\_

Program: \_\_\_\_\_ Period: \_\_\_\_\_ Year: \_\_\_\_\_

\_\_\_\_\_ has observed safe operating procedure, has passed (student's name)

required safety exams, and is permitted to operate the items dated according to accepted safety regulations.

Tools or Equipment	Enter	Date	Completed
	Teacher Demonstration	Written Test Passed	Performance Test Passed
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
13.			
14.			
15.			

**The agency will keep this record until the student reaches age 21.**



# **OSHA Regulations**

## **Appendix C**

# OSHA

## Regulations – 1910 (Industrial)

[http://www.osha-slc.gov/OshStd\\_toc/  
OSHA\\_std\\_toc\\_1910.html](http://www.osha-slc.gov/OshStd_toc/OSHA_std_toc_1910.html)

### **Subpart B - Adoption and Extension of Established Federal Standards**

1910.17 Effective dates

### **Subpart G - Occupational Health and Environmental Control**

1910.94 Ventilation

1910.95 Occupational noise exposure

### **Subpart H - Hazardous Materials**

1910.101 Compressed gases (general requirements)

1910.102 Acetylene

1910.103 Hydrogen

1910.104 Oxygen

1910.106 Flammable and combustible liquids

1910.107 Spray finishing using flammable and combustible materials

1910.108 Dip tanks containing flammable or combustible liquids

1910.109 Explosives and blasting agents

1910.120 Hazardous waste operations

### **Subpart I - Personal Protective Equipment**

1910.132 General requirements

1910.133 Eye and face protection

1910.134 Respiratory protection

1910.135 Heat protection

1910.136 Foot protection

1910.137 Hand protection

1910.138 Respiratory protection

### **Subpart J - General Environmental Controls**

1910.144 Safety color code for marking physical hazards

1910.145 Specifications for accident prevention signs and tags

### **Subpart K - Medical and First Aid**

1910.151 Medical services and first aid

### **Subpart M - Portable Fire Extinguishers**

1910.157 Portable fire extinguishers

### **Subpart N - Materials Handling and Storage**

1910.176 Handling material - general

1910.179 Overhead and gantry cranes

### **Subpart O - Machinery and Machine Guarding**

1910.212 General Requirements for all machines

1910.215 Abrasive wheel machinery

1910.216 Mills and calendars in the rubber and plastic industries

1910.217 Mechanical power presses

1910.218 Forging machines

1910.219 Mechanical power-transmission apparatus

**Subpart P - Hand and Portable Powered Tools and Other Hand-Held Equipment**

1910.242 Hand and portable powered tools and equipment, general

1910.243 Guarding of portable powered tools

**Subpart Q - Welding, Cutting, and Brazing**

1910.253 Oxygen-fuel gas welding and cutting

1910.254 Arc welding and cutting

1910.255 Resistance welding

**Subpart S - Electrical**

1910.335 Safeguards for personnel protection

**Subpart Z - Toxic and Hazardous Substances**

1910.1002 Coal tar pitch

## **OSHA**

### **Regulations – 1926 (Construction)**

**see all subparts at web site**

[http://www.osha-slc.gov/OshStd\\_toc/  
OSHA\\_Std\\_toc\\_1926.html](http://www.osha-slc.gov/OshStd_toc/OSHA_Std_toc_1926.html)

## **State Regulations**

**see all subparts at web site**

<http://www.labor.state.ut.us>

# **MSDS**

**(Material Safety Data Sheet)**

## **Appendix D**

# Hazardous Communication

(Handling of Hazardous Chemicals and Materials)

## RIGHT-TO-KNOW

Whenever chemicals are handled, used or stored on the school premises, the administration, instructors, and students should be familiar with the Federal Hazard Communication Standard. On November 25, 1983 the Occupational Safety and Health Administration (OSHA) put in place the Federal Hazard Communication Standard. The purpose of this set of regulations was to protect employees from the potentially adverse effects of hazardous chemicals that they might come into contact with in their workplace. Initially, this regulation affected only manufacturers of potentially hazardous chemicals and those companies which used them. Since that time the law has been amended and the state has adopted laws to cover additional types of facilities and operations. It is imperative that ATE educators become familiar with these laws as they affect them.

The intent of all the right-to-know regulations is basically the same, "to protect employees from possible adverse effects of any potentially hazardous chemicals that they may encounter in their workplace." This intent weaves its way through all aspects of the laws and regulations, and is especially important when students are in contact with various chemicals.

Students must be instructed on what MSDSs include and where they are located. (They should be readily available and show how to quickly find needed emergency information.)

# **MSDS**

## **(Material Safety Data Sheet)**

Every lab or shop is required to have a readily accessible file containing Materials Safety Data Sheets (MSDSs) for all hazardous chemicals and materials used in the facility.

These can be obtained from the supplier or manufacturer. There are also several web sites that contain a comprehensive list that you can download. For a list of Internet sites just type: <http://www.ilpi.com/msds/index.html>

See example on the next page.

RUST-OLEUM -- PAINT THINNER  
MATERIAL SAFETY DATA SHEET  
NSN: 801000F003789  
Manufacturer's CAGE: 08882  
Part No. Indicator: B  
Part Number/Trade Name: PAINT THINNER

=====  
General Information  
=====

Company's Name: RUST-OLEUM CORP  
Company's Street: 11 HAWTHORNE PKWY  
Company's City: VERNON HILLS  
Company's State: IL  
Company's Country: US  
Company's Zip Code: 60061-1583  
Company's Emergency Ph #: 312-367-7700/312-864-8200  
Company's Info Ph #: 312-367-7700/312-864-8200  
Record No. For Safety Entry: 002  
Tot Safety Entries This Stk#: 002  
Status: SE  
Date MSDS Prepared: 21MAY92  
Safety Data Review Date: 26JUN96  
Preparer's Company: RUST-OLEUM CORP  
Preparer's St Or P. O. Box: 11 HAWTHORNE PKWY  
Preparer's City: VERNON HILLS  
Preparer's State: IL  
Preparer's Zip Code: 60061-1583  
MSDS Serial Number: BZBVZ

=====  
Ingredients/Identity Information  
=====

Proprietary: NO  
Ingredient: XYLENE, DIMETHYLBENZENE, XYLOL (IARC - GROUP 3) \*96-2\*  
Ingredient Sequence Number: 01  
Percent: 70  
NIOSH (RTECS) Number: ZE2100000  
CAS Number: 1330-20-7  
OSHA PEL: 100 PPM  
ACGIH TLV: 100 PPM, SKIN  
Other Recommended Limit: 100 PPM

-----  
Proprietary: NO  
Ingredient: PROPYLENE GLYCOL METHYL ETHER (1-METHOXY-2-PROPANOL)  
PROPYLENE  
GLYCOL MONO METHYL ETHER \*96-2\*  
Ingredient Sequence Number: 02  
Percent: 30

NIOSH (RTECS) Number: UB7700000  
CAS Number: 107-98-2  
ACGIH TLV: 100 PPM  
Other Recommended Limit: 100 PPM

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Physical/Chemical Characteristics

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Boiling Point: 248-284F  
Vapor Density (Air=1): >1  
Specific Gravity: SCC  
Evaporation Rate And Ref: SLOWER THAN ETHER  
Percent Volatiles By Volume: 100

=====

Fire and Explosion Hazard Data

=====

Flash Point: 81F  
Extinguishing Media: CO2, DRY CHEMICAL/FOAM  
Special Fire Fighting Proc: WEAR FULL PROTECTIVE EQUIPMENT & SCBA. WATER MAY BE USED TO COOL CLOSED CONTAINERS TO PREVENT PRESSURE BUILD UP. IF WATER IS USED, FOG NOZZLES ARE PREFERRED.  
Unusual Fire And Explosion Hazards: CLOSED CONTAINERS MAY EXPLODE WHEN EXPOSED TO EXTREME HEAT.

=====

Reactivity Data

=====

Stability: YES  
Materials To Avoid: STRONG OXIDIZING AGENTS  
Hazardous Decomp Products: OPEN FLAME: CO, CO2  
Hazardous Poly Occur: NO

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Health Hazard Data

=====

Route Of Entry - Inhalation: YES  
Route Of Entry - Skin: NO  
Route Of Entry - Ingestion: YES  
GASTROINTESTINAL IRRITATION.  
Carcinogen city - NTP: NO  
Carcinogen city - IARC: NO  
Carcinogen city - OSHA: NO  
Explanation Carcinogen city: NONE  
Signs/Symptoms Of Overexp: DIZZINESS, HEADACHE, STAGGERING GAIT, CONFUSION, UNCONSCIOUSNESS/COMA, NAUSEA, VOMITING, DIARRHEA & IRRITATION.  
Emergency/First Aid Proc: INHALATION: REMOVE FROM EXPOSURE, RESTORE BREATHING. EYES: FLUSH IMMEDIATELY W/LARGE AMOUNTS OF WATER. SKIN: WASH AREA W/SOAP & WATER. INGESTION: INDUCE VOMITING. NEVER GIVE ANYTHING TO AN UNCONSCIOUS PERSON. OBTAIN MEDICAL ATTENTION IN ALL CASES.

=====

Precautions for Safe Handling and Use

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Steps If Matl Released/Spill: REMOVE ALL SOURCES OF IGNITION, VENTILATE AREA & REMOVE W/INERT ABSORBENT & NON-SPARKING TOOLS.  
Waste Disposal Method: DON'T INCINERATE CLOSED CONTAINERS. DISPOSE OF IAW/FEDERAL, STATE & LOCAL REGULATIONS.  
Precautions-Handling/Storing: DON'T STORE ABOVE 120F. STORE LARGE QUANTITIES IN BUILDINGS DESIGNED & PROTECTED FOR STORAGE OF NPA CLASS IC FLAMMABLE LIQUID.  
Other Precautions: CONTAINERS SHOULD BE GROUNDED WHEN POURING. EMPTY CONTAINERS MAY BE HAZARDOUS.

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Control Measures

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Respiratory Protection: USE NIOSH APPROVED CHEMICAL CARTRIDGE RESPIRATOR TO REMOVE SOLID AIRBORNE PARTICLES OF OVERSPRAY & ORGANIC VAPORS. CONFINED AREAS: USE NIOSH APPROVED SUPPLIED AIR RESPIRATORS/HOODS.  
Ventilation: GENERAL DILUTION/LOCAL EXHUAUST IN VOLUME & PATTERN TO KEEP TLV BELOW ACCEPTABLE LIMITS.  
Protective Gloves: RECOMMENDED  
Eye Protection: EYEWEAR TO PROTECT AGAINST SPLASH.

=====

Transportation Data

=====

Disposal Data

=====

Label Data

=====

Label Required: YES  
Label Status: G  
Common Name: PAINT THINNER  
GASTROINTESTINAL IRRITATION. DIZZINESS, HEADACHE, STAGGERING GAIT, CONFUSION, UNCONSCIOUSNESS/COMA, NAUSEA, VOMITING, DIARRHEA & IRRITATION.  
Label Name: RUST-OLEUM CORP  
Label Street: 11 HAWTHORNE PKWY  
Label City: VERNON HILLS  
Label State: IL  
Label Zip Code: 60061-1583  
Label Country: US  
Label Emergency Number: 312-367-7700/312-864-8200

# Guidelines for Handling Flammable and Combustible Liquids

- Read the manufacturer's label information and MSDS before using a product.
- Withdraw only as much material as you will need to complete the immediate operation.
- Dispose of waste materials in approved containers.
- Use a funnel when pouring into a smaller container.
- Follow instructions for handling and mixing catalysts with resins and finishes.
- Never pour catalyst back into the container.
- Always add catalyst to resin, not resin to catalyst. Add acid to water, not water to acid.
- Do not apply resin, paint, or other finishing material near areas used for flame cutting, welding, grinding, soldering, or other high temperature operations.
- Store materials in original containers or approved containers that are properly labeled.
- Wear rubber gloves to minimize chances of skin irritation.
- Wash hands and other exposed skin areas before leaving the classroom.
- Store volatile materials in approved fireproof cabinets or specially designed areas.
- Remove clothing that may have become accidentally soaked with epoxy, polyester resins, and other potentially dangerous substances.
- Be certain the fire extinguisher located in a work area is suited for application to a fire caused by the materials being used in the work area.
- If you are unsure of materials or procedures to complete an operation, ask the instructor for help.

Some of the more hazardous flammable liquids are listed below in approximate order of hazard.

- Starting fluids
- Gasoline
- Aerosol cans
- Catalysts
- Carburetor cleaner
- Acetone
- Lacquer thinner
- Adhering liquid (printing)
- Paint thinner
- Alcohol
- Shellac
- Japan dryer
- Kerosene
- Paint, oil
- Resin (polyester)
- Stain and varnish
- Danish oil

# Chemical Safety

Today's ATE educators must be conscious of potential chemical hazards. New concerns are being raised daily about the potential long-term effect chemicals might have on students, instructors, and the environment. Unless handled and used with rigorous care, all chemicals have the potential to cause injury and illness. For safe, effective use of chemicals, the following guidelines are suggested:

- Become familiar with every chemical before you use it. Know what it does and how it does it. Find out about the specific safety precautions, what protective equipment to wear, signs or illness associated with use, and what to do with empty containers and leftovers. Advise students of these facts. The label on the chemical container will provide most of the information you need. Your dealer is a good source of information.
- Use the least toxic chemical that will still be effective.
- Make sure that non-workers are out of the work area.
- When using a chemical that could harm you if it came in contact with your body, wear personal protective equipment—unlined liquid-proof gloves, liquid-proof hat with brim, boots, clothing, chemical goggles, face shields, and an appropriate respirator for the chemical being used.
- To protect ground water, be careful of spills when mixing and loading. If a spill occurs, clean it up promptly.
- Dry chemicals may not be especially toxic, but breathing the dust can irritate your lungs and throat. A simple filter respirator will block out dry mineral dust particles. Also, handling dry chemicals can dry out and irritate your hands. Gloves and/or coating hands with a protective cream will help.
- Consult your dealer for steps on how to safely dispose of empty containers and leftover chemicals. Don't dump them into any unapproved places where they could pollute ground water, wells, streams, or harm people and animals.
- With lower toxicity chemicals, less stringent measures will usually suffice, but they must still be adequate. Follow label recommendations, and limit exposure to any chemical you're using. If possible, avoid breathing dust, vapors or spray. Avoid splashes and spills when handling. Don't eat until you've washed thoroughly.
- If someone is splashed or doused with a toxic chemical, or inhales or ingests a toxic chemical, call the poison control center immediately. Be ready to tell them what the chemical was and the suspected level of exposure the victim suffered.
- Store chemicals in their original labeled containers, away from living areas, in a place inaccessible to children.

# **Hazardous Waste**

## **Appendix E**

# Environmental Quality – Hazardous Waste

Most Local Education Agencies (LEAs) have departments and/or staff dedicated to environmental quality – hazardous waste. When disposal issues arise your local EQ staff should be consulted. There are state contactors available who could help when the education agency is unable to assist in the disposal of hazardous waste. The following questions are guides and should be answered to safely dispose of hazardous waste. Answers are available from your local staff or the Utah Department of Environmental Quality.

## HAZARDOUS WASTE DISPOSAL

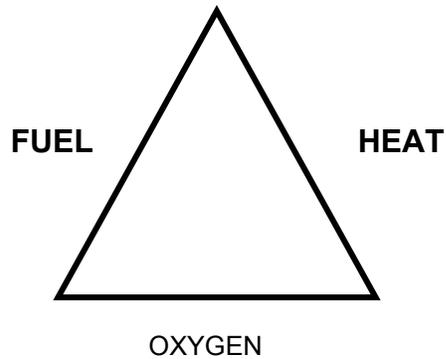
1. What rules do we fall under?
2. How do we go about getting rid of the waste?
3. How is this waste stored?
4. Must there be a containment basin? How long can we store this waste?
5. Can we mix chemical wastes?
6. Do we have to obtain an analysis of the material?
7. Do we have to ship it to a storage site?
8. What size and type of storage containers are necessary?
9. What is the cost of testing, shipping and storage?
10. Is there a limit to the amount of waste that can accumulate before you have to send it to a disposal site?
11. Can we use a satellite collection system?

# **Fire Safety**

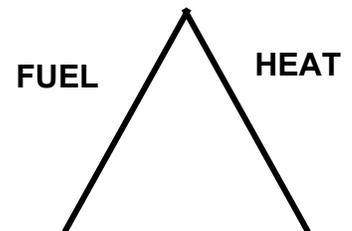
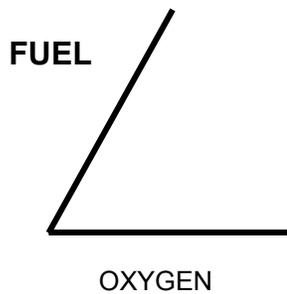
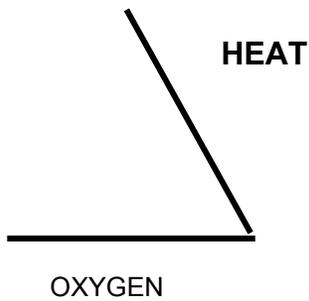
## **Appendix F**

# The Fire Triangle

To produce fire, three things must be present at the same time.



If any one of the three is missing, a fire cannot be started; or with the removal of any one, the fire will be extinguished.



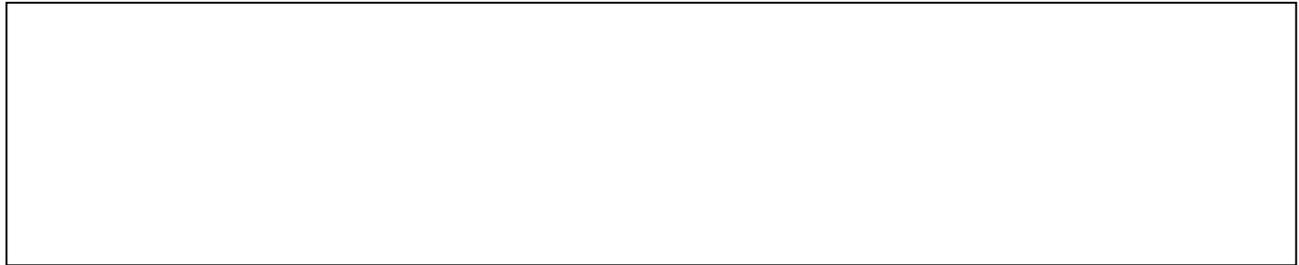
# Standard Letter Symbols for Fire Extinguishers

GREEN

RED

BLUE

YELLOW



ORDINARY  
COMBUSTIBLES

FLAMMABLE  
LIQUIDS

ELECTRICAL  
EQUIPMENT

COMBUSTIBLE  
METALS

Distinctive letters, shapes, and colors mark extinguishers according to the classes of fires on which they should be used.

# Types of Fire Extinguishers

**Dry Chemical** extinguishers are usually rated for multipurpose use. They contain an extinguishing agent and use a compressed, non-flammable gas propellant.

**Water** these extinguishers contain water and compressed gas and should be used on Class A (ordinary combustibles) fires.

**Halon or Halatron** extinguishers contain a gas that interrupts the chemical reaction that takes place when fuels burn. These types of extinguishers are often used to protect valuable electrical equipment since they leave no residue to clean up.

**Carbon Dioxide (CO<sup>2</sup>)** extinguishers are most effective on Class B and C (liquids and electrical) fires. Since the gas disperses quickly, these extinguishers are only effective from 3 to 8 feet. The Carbon Dioxide is stored as a compressed liquid in the extinguisher.

# The New ABCD's of Portable Fire Extinguishers

A fire extinguisher is a storage container for an extinguishing agent such as water or chemicals. It is designed to put out a small fire, not a big one.

An extinguisher is labeled according to whether the fire on which it is to be used occurs in wood or cloth, flammable liquids, electrical, or metal sources. Using one type extinguisher on another type fire can make the fire much worse, so learn how extinguishers are labeled and used.

Traditionally the labels A, B, C, or D have been used to indicate the type of fire on which an extinguisher is to be used.

Recently pictograms have come into use. These picture, in blue, the type of fire on which an extinguisher is to be used. Shown in black with a red slash are pictures of fires on which the extinguisher is not to be used. For example, on a Class A extinguisher, the following symbols would appear:

NFPA 10, Standard for Portable Fire Extinguishers, recommends that extinguishers be labeled with pictograms. However, the user may find the traditional A, B, C, D labels, or both the pictograms and the A, B, C, D labels on an extinguisher.

You need an extinguisher at home.

If you plan to buy one extinguisher, a multipurpose dry chemical extinguisher labeled ABC puts out most types of fires—wood, paper, and cloth, flammable liquid, or electrical fires.

If you buy more than one, you might want to get a BC for the kitchen, an A for the living room, and an ABC for the basement or garage.

Fire extinguishers are also necessary where you work. It is management's job to have extinguishers available for use and your job to know how they work.

Buying and maintaining an extinguisher.

1. Extinguishers come in dry chemical, foam, carbon dioxide, water or halon types. Whatever type you buy, it should be labeled by a testing laboratory.
2. The higher the number rating on the extinguisher, the more fire it puts out. high rated ones are often (not always) the heavier models. Make sure you can hold and operate the one you might buy for home use or be required to use at work.
3. Ask your dealer how to have your extinguisher serviced and inspected. Recharge it after ANY use. A partially used one might as well be empty.
4. Extinguishers should be installed away from potential fire hazards and near an escape route.
5. For more details, see Standard for Portable Fire Extinguishers, NFPA 10.

# ABCD's

**Class A** - Extinguish ordinary combustibles by cooling the material below its ignition temperature and soaking the fibers to prevent re-ignition.

Fires in paper, cloth, wood, rubber and many plastics require a water-type extinguisher labeled A

**Class B** - Extinguish flammable liquids, greases or gases by removing the oxygen, preventing the vapors from reaching the ignition source or inhibiting the chemical chain reaction.

Fires in oils, gasoline, some paints, lacquers, grease in a frying pan or in the oven, solvents and other flammable liquids require an extinguisher labeled B.

**Class C** - Extinguish energized electrical equipment by using an extinguishing agent that is not capable of conducting electrical currents.

Fires in wiring, fuse boxes, energized electrical equipment and other electrical sources require an extinguisher labeled C.

**Class D** - Extinguish combustible metals such as magnesium, titanium, potassium and sodium with dry powder extinguishing agents specially designated for the material involved.

Combustible metals such as magnesium and sodium require special extinguishers labeled D.

# **Facilities**

## **Appendix G**

# General Facility Considerations

The locations in which learning activities will take place is a key factor in determining the quality of the learning experience for the student. A safe environment can be established with careful planning and continuous effort to maintain proper conditions.

## LIGHTING

Adequate and well-maintained lighting is essential to a safe work environment.

## FACILITY SIZE

The size and shape of the facility, arrangement, and location of passageways, storage, and work areas are important factors in establishing safe working conditions. The number of students that can be safely placed into an instructional program will vary with program requirements and activities. Some programs that involve moving long materials that will be cut and shaped require more room per student than may be required for activities where the student is seated and the work confined to his/her immediate area.

Each student must have a place to work. The type of work may vary between students in the same class. Count the number of workstations available and compare with the number enrolled. If the number of students placed into the instructional program is greater than the recommended number, the potential for accidents will increase.

## MAINTENANCE AND HOUSEKEEPING

- \* Facilities should be cleaned daily to prevent accumulation of dirt and debris.
- \* Rags and other waste materials susceptible to spontaneous combustion should be discarded in identified metal containers of the self-closing type.
- \* Scrap or short stock that remain from cutting operations should be stored in containers near the work area.
- \* Waste materials should be kept off the floor.
- \* Tools and equipment must have a designated storage place that is marked, easily accessible, and safe for the removal and replacement of the items.
- \* Students should be responsible for assisting in keeping the facility organized and clean.

## COLOR CODE

There is not a definite standard for colors to be used for “color coding” equipment, but using different colors or shades of the same color is an excellent way to distinguish between various parts of equipment. Colors used should be consistent in their meaning, and relate to the operation or hazard involved. For example, if brown is used to indicate major control levers on a given piece of equipment, then it should be used on other equipment in the same area to indicate major control features such as handles, levers, or adjustment controls.

## SUGGESTIONS FOR USING COLOR

**YELLOW** – To designate caution and for marking physical hazards such as potential for striking against, stumbling, falling, tripping and becoming “caught in between.” Solid yellow, yellow and black stripes, or yellow and black checkers should be used to attract attention to the area of concern.

**RED** – Basic color of fire-related equipment such as fire protection equipment, alarm boxes, fire blanket boxes, fire buckets or pails, fire exit signs, fire extinguishers and their location, and the location of the fire hose.

**ORANGE** – To designate dangerous parts of machines or energized equipment which may cut, crush, shock or otherwise injure. Orange should emphasize such hazards as when enclosure doors are open or when the gear belt or other guards around moving equipment are open or removed.

**GREEN** – The basic color for designating “safety” and the location of first aid equipment other than fire fighting equipment.

**BLUE** – Used to designate caution, limited to warning against the starting, use, or moving of equipment under repair.

**BLACK** – A combination of black and white should designate traffic and housekeeping markings. Solid white, solid black, single-color striping, alternate stripes or black and white checkers should be used in accordance with local conditions.

## FLOORS

The following items should be considered when planning facility safety.

- \* Safety zones should be marked around machines to provide ample workspace for the operator and to prevent interference with the operator.
- \* Nonskid material should adhere to the floor where the operator works. Mats or slats are not recommended.
- \* Machines and equipment should be arranged so that materials are processed in an orderly and efficient manner that does not interfere with other workers.
- \* Aisles should be kept clear at all times. Recommended width is 48”, with 36” considered minimum.
- \* Floors should be kept clear of all foreign materials which could cause falls. Immediate cleanup of spills will help prevent accidents.
- \* Concrete floors should be sealed and not painted. Care should be taken to keep floors from becoming slick.

## NOISE EXPOSURE

Some facilities produce higher noise levels than others. The noise level, along with the time of exposure, must be kept to acceptable levels. Noise can be controlled with personal earplugs, acoustical treatment, or construction with sound-absorbing materials.

## Estimated Noise Levels Produced by Common Sources

Decibels	Activity
70 .....	Normal speaking voice at 3 feet.
75 .....	Classroom teaching voice at 3 feet
80 .....	Inside care (windows open – 55 mph).
80-90 .....	Grinder, lathe, arc welding.
90-99 .....	Saws, router, lawn mower,
100-109 .....	Wood jointer, pneumatic press.
115 .....	Planer, firecrackers.
120-129 .....	Pneumatic air hoist, internal combustion engine test.
130 .....	Jet engine.

Permissible Noise Exposures	
Duration Per Day in Hours	Sound Level dBA slow response
8	..... 90
6	..... 92
4	..... 95
3	..... 97
2	..... 100
1.5	..... 102
1	..... 105
0.5	..... 110
0.25 or less	..... 115

## MODIFICATIONS FOR SPECIAL NEEDS STUDENTS

In the past, many special needs learners have been denied their basic right to a public education because of architectural barriers and non-adaptive facilities, equipment, and tools. However, federal legislation has done a great deal to provide equal access to educational programs for every learner. For example, according to Section 503 of the Rehabilitation Act of 1973, each federally funded program or activity in which a handicapped individual can enroll and profit must be made accessible to the student (Sarkees and Scott, 1985). In addition, the Carl D. Perkins Act of 1984 has emphasized the importance of providing supplemental services for special needs learners, which includes the adaptation of facilities, equipment, curriculum, and instruction.

## **MODIFYING FACILITIES**

A barrier-free facility planned for safety, efficiency, and convenience is of vital importance to individuals with special needs—especially those who are in wheelchairs, on crutches, or have artificial limbs. According to Sarkees and Scott (1985), three major areas in which architectural barriers may be present at most vocational education facilities are:

- \* Getting to and entering the building (getting to the ground from public or private transportation; parking; negotiating parking lot pavement, curbs, walkways ramps, and stairways; and entering exterior doors).
- \* Moving about inside a building (moving through corridors and hallways; moving from floor to floor; identifying and entering classrooms, laboratories, and auxiliary areas; moving through aisles and traffic lanes inside classrooms and laboratories).
- \* Using school fixtures, appliances, and study/work station area equipment (using rest rooms, drinking fountains, vending machines, tools, machines, and work station apparatus).

In an effort to eliminate these barriers, vocational educators, planners, and administrators should contact the State Building Board or State Office of Education regarding the guidelines and standards that have been developed for compliance with federal mandates. The federal government has adopted the American National Standards Institute (ANSI) accessibility standards as its mandatory guidelines for removal of architectural barriers.

## **MODIFYING EQUIPMENT AND TOOLS**

Based upon the needs of each learner, it may become necessary to modify existing equipment and tools to accommodate the special needs students. The degree of modification will depend upon the type and extent of each student's impairment. It should be remembered, however, that equipment should be modified only to the extent necessary to assist the student. Whenever possible, as the student generates competence in a learning task, the modified equipment should be replaced with regular equipment. The following are some general suggestions for modifying equipment and tools for specific classifications of special needs students.

## **MODIFICATIONS FOR ORTHOPEDICALLY IMPAIRED STUDENTS**

- \* Work benches can be cut out so that wheelchair-bound students can pull close to the work surface.
- \* Modify the height of workbenches, storage cabinets, tabletops, etc., to make them accessible to wheelchair-bound students.
- \* A lapboard can be fitted on the arms of the wheelchair to provide a work area.
- \* Rearrange storage areas for tools and supplies to make them accessible, and place as near to the workstation as possible.
- \* Position bench-mounted power tools on the ends of benches.
- \* Semi-stationary equipment should be put on variable-height bases.
- \* Modify machine controls so they can be operated with prostheses, such as an arm hook.

- \* Replace cabinet knobs with levers or handles.
- \* Convert knob-type on/off switches to toggle switches, levers or slide-adjustment mechanisms.
- \* Provide an aid that increases mechanical advantage in manipulating controls.
- \* Convert machines and equipment that have hand controls to the foot pedal type for students who have upper extremity disabilities.
- \* Select machines that do not require two-handed operation, such as a radial arm saw instead of a table saw.
- \* Place small parts or instruments on a foam pad to aid students in picking them up.
- \* Select tools that require only one hand to operate, such as split screwdrivers, which hold screws and bolts on starting.
- \* Provide holding devices such as vacuum vises, stationary vises, clamps, jigs, and fixtures that permit one-handed operation.
- \* Provide tools that supply more mechanical advantage to loosen or tighten screws or bolts, such as a lever-type socket set or an offset screwdriver.
- \* For students who have weak hands, increase the size of tool handles by replacing them with larger diameter handles or by enlarging them with tubing or tape wrappings.
- \* Provide templates to aid drafting students who have trouble manipulating standard drafting instruments.

## **MODIFICATIONS FOR HEARING-IMPAIRED STUDENTS**

- \* Install a red light next to the on/off switch so the student can tell when the machine is in operation.
- \* Install amplification devices on auditory warning signals so they can be heard by those with partial hearing.
- \* Use visual timers in place of those that emit sounds.

## **MODIFICATIONS FOR VISUALLY IMPAIRED STUDENTS**

- \* Purchase commercially available measuring tools with raised or engraved markings that can be read by touch.
- \* Purchase measuring devices that provide auditory signals.
- \* Braille tape or raised marks can be used on control dials and switches.
- \* Enlarge markings on tools, tool holders, or machine controls.
- \* Provide jigs, guides, and templates to aid students in positioning and guiding tools.
- \* Identify controls by changing their size, shape or texture.

## **MODIFICATIONS FOR MENTALLY IMPAIRED STUDENTS**

- \* Color code important parts of machines or equipment.
- \* Devise jigs, fixtures, templates, and guides to simplify work task operations.

## **MATERIAL AND SUPPLY STORAGE**

Materials and supplies should be easily accessible but safely stored. Storage areas should be designed so that the longest “stock length” of material could be stored without cutting. Locked storage of materials and supplies will reduce loss and waste, and improve classroom organization.

Materials should not protrude into aisles or work areas and should be located near equipment that will be used to cut the stock lengths into sizes needed. Overhead storage should be avoided unless an approved safe stairway provides accessibility to the supplies and materials. Overhead storage may require additional supervision.

Special storage containers or areas may be required for different products. Instruction in safe handling of material should include proper lifting of oversize or heavy objects, and safe movement of materials through the work area.

## **DUST, FUMES, VAPORS AND COMBUSTIBLE METALS**

Dust or fumes found in the work area can be irritating to some people. Classroom exposure may be controlled by following these suggestions:

- \* Use adequate ventilation equipment to remove dust and fumes from the work area.
- \* Sweep or vacuum after each class period to dispose of waste products produced by manufacturing processes.
- \* Wear an appropriate respirator when working on a dust-producing operation.
- \* Consult your instructor before cutting, welding, or grinding on galvanized metals.
- \* Asbestos dust is a particular hazard that requires extra protection. If protective devices are not in the work area you cannot work with the asbestos materials.
- \* Unstable metals such as magnesium must be used with caution.
- \* Adequate ventilation is essential when cutting, welding, soldering, melting, or machining lead or zinc.

## **ELECTRICAL EQUIPMENT**

Electrical equipment must meet or exceed local, state or national building codes. The following suggestions are recommended.

- \* Three-prong, self-grounding plugs should be utilized with all 110-volt electrical equipment. UL-approved double-insulated tools are recommended.
- \* Machinery should be equipped with magnetic-type switches.
- \* All switches should be of the type that require deliberate action to open and close, so that accidental contact would not start or stop the equipment.
- \* Controls should be easily accessible to the operator.
- \* When plunger-type switches are used, a push should shut off the machine.
- \* Switch boxes should be locked to prevent unauthorized operation of equipment. An emergency cutoff switch should be placed in a central location in the facility.
- \* Extension cords should be heavy-duty or sized to carry the largest expected

- electrical load.
- \* Overhead bus bar or grid wiring is recommended.

## **FIRE PREVENTION AND EXTINGUISHMENT**

Fires generally follow explosions resulting from improper storage or handling of combustible materials. The cause of most common fires can be controlled by observing the following recommendations:

1. Finishing rooms and booths should be properly constructed to eliminate sparks and provide adequate ventilation.
  - a. Lights, switches, and motors should be explosion-proof and sealed to keep vapors out.
  - b. All electrical equipment must be grounded.
  - c. Control of static electricity.
    - i. Do not allow students to wear nylon or polyester clothing when spraying finishing.
    - ii. Do not allow conductive flooring in spray booths.
2. A metal storage cabinet for paints, thinners, and other flammable materials is a necessity.
3. A fire extinguisher of the proper type should be located in the finishing area.
4. Spontaneous combustion can be avoided by storing oily or dirty rags in approved metal containers of the self-closing type.
5. Gasoline should be used only as fuel and stored in approved containers away from heat.
6. Accumulation of sawdust in the air is a fire hazard. Dust collection devices and ventilation are needed.
7. Supervision of furnace lighting and shutdown in the hot metals area is necessary.
8. Explosive plastics or other chemicals should be used or mixed in the finishing room or a similar place that will meet the same standards in regard to fire hazards and ventilation.
9. Welding equipment as gas cylinders such as oxygen, acetylene, argon, carbon dioxide, etc., should be handled with extreme caution.
  - a. Store welding cylinders in an upright position with protective cap in place away from heat and combustible materials.
  - b. Do not allow a cylinder to stand free. It should be attached to a cart, wall, rack, etc. to prevent falling.
  - c. Never handle cylinders without the protective cap in place.
  - d. Mark cylinders "full" or "empty" with chalk.
  - e. Manifold systems must have an approved blowout prevention device.
  - f. Flashback arresters should be used on the welding hose.
  - g. Oxygen cylinders in storage should be separated from fuel gas cylinders by a minimum distance of 20 feet, or be behind a noncombustible barrier at least five feet high having a fire resistance rating of at least one-half hour.
10. Fire extinguishers should be adequate in number and approved for the type of fire that could occur in the work area.

# **First Aid**

## **Appendix H**

# Accidents and First Aid

## INSIST THAT ACCIDENTS, NO MATTER HOW SMALL, BE REPORTED TO YOU.

If the accident is serious, fill out a report form and submit it to your principal.

- \* **FIRST AID KIT** – Every lab should have an adequate and fully maintained first aid kit.
- \* **WASH OFF AREA** – Wash with water any area that might have something spilled on it.
- \* **FLOOD ANY BURNED AREA WITH COLD WATER** - This will draw the heat away from the burn. Continue to do this until further help can be obtained. You should NOT apply any ointments.
- \* **COMPRESS THE WOUND** – All labs should have large sterile pads. After removing any foreign material from a cut, compress it to stop the bleeding. You should NOT apply any ointment or tourniquets.
- \* **WASH SPILLS TO THE EYES FOR A FULL 15 MINUTES** – Use an eye-wash bottle or station and hold the eyes wide open. If eye washes are unavailable then splash water from your hands.
- \* **DO NOT TREAT MAJOR INJURIES YOURSELF; CALL FOR ASSISTANCE OR 911** – You may only legally stop the bleeding (compresses). There should be one person in your area who is trained in CPR and other life-threatening injury first aid procedures. Do not attempt these procedures unless you are specifically trained. Never move or transport the injured.
- \* **POISON CONTROL CENTER: 1-800-456-7707**

# Bloodborne Pathogens

- o Use appropriate Personal Protective Equipment (PPE) when working with blood or infectious materials.
  - \* Check PPE first for damage
  - \* Remove PPE carefully to avoid self-contamination.
  - \* Dispose of contaminated PPE correctly in leak-proof containers for disposal or for decontamination.
  
- o Use good personal hygiene.
  - \* Wash exposed skin immediately with soap and water
  - \* Wash thoroughly after removing PPE.
  - \* Flush exposed eyes, nose or mouth quickly and thoroughly with water.
  - \* Cover open cuts.
  - \* Minimize splashing of infectious materials.
  - \* Clean up spills immediately.
  
- o Report on-the-job exposures promptly and seek immediate medical attention.

# **Instruction**

## **Appendix I**

**SAMPLE SAFETY UNIT**

**OF INSTRUCTION**

# Safety Unit Information Sheet

- I. Terms and definitions:
  - A. Safety-State or condition of being safe; freedom from danger, risk or injury.
  - B. Accident-Includes any suddenly occurring, unintentional event which causes injury or property damage.
  - C. First aid-Immediate, temporary care given to the victim of an accident or sudden illness until the services of a physician can be obtained.
- II. Colors and application of the safety color code.
  - A. Federal safety red-the basic color for the identification of:
    - 1. Fire protection equipment and apparatus.
    - 2. Portable containers of flammable liquids.
    - 3. Emergency stop bars, stop buttons, and emergency electrical stop switches on machinery.
  - B. Federal safety yellow-the basic color for designating:
    - 1. Caution and for marking physical hazards.
    - 2. Waste containers for explosive or combustible materials.
    - 3. Caution against starting, using, or moving equipment under repair.
    - 4. Identification of the starting point or power source of machinery.
  - C. Federal safety orange-the basic color for designating:
    - 1. Dangerous parts of machines.
    - 2. Safety starter buttons.
    - 3. The exposed parts (edges only) of pulleys, gears, rollers, butting devices, and power jaws.
  - D. Federal safety purple-the basic color for designating:
    - 1. Radiation hazards.
  - E. Federal safety green-the basic color for designating:
    - 1. Safety.
    - 2. Location of first aid equipment. (NOTE: This applies to equipment other than fire fighting equipment.)
  - F. Federal safety black and white (used individually or in combination)-the basic colors for designating:
    - 1. Traffic flow.
    - 2. Housekeeping purposes.
- III. Personal safety rules:
  - A. Wear shop clothing appropriate for the instructional activity being performed.
  - B. Confine long hair before operating rotating equipment.
  - C. Always wear safety glasses; use suitable helmets and goggles for welding.
  - D. Remove ties when working around machine tools or rotating equipment.
  - E. Remove rings and other jewelry when working in the shop.
  - F. Conduct yourself in a manner conducive to safe shop practices.
  - G. Use soap and water frequently as a method of preventing skin disease.
- IV. General safety rules:
  - A. Keep all hand tools sharp, clean and in safe working order.
  - B. Report any defective tools, machines or other equipment to the instructor.
  - C. Retain all guards and safety devices except with the specific authorization of the instructor.

- D. Operate a hazardous machine only after receiving instruction on how to operate the machine safely.
  - E. Report all accidents to the instructor regardless of nature or severity.
  - F. Turn off the power and make certain the machine has stopped running before leaving.
  - G. Make sure all guards and barriers are in place and adjusted properly before starting a machine tool.
  - H. Disconnect the power from machine tools before performing the maintenance task of oiling or cleaning.
  - I. Use solvent only after determining its properties, what kind of work it has to do, and how to use it.
  - J. Use correct properly fitting wrenches for nuts, bolts, and objects to be turned or held.
  - K. Keep the shop or laboratory floor clean of scraps and litter.
  - L. Clean up any spilled liquids immediately.
  - M. Oily rags or oil waste should be stored in metal containers.
  - N. Clean the chips from a machine with a brush—not with a rag or the bare hands.
  - O. Do not use compressed air to clean your person or clothing.
- V. Methods used to maintain a clean and orderly shop:
- A. Arrange machinery and equipment to permit safe, efficient work practices and ease in cleaning.
  - B. Stack materials and supplies safely or store in proper place.
  - C. Store tools and accessories safely in cabinets, on racks, or in other suitable devices.
  - D. Clear working areas and work benches of debris and other hazards.
  - E. Clean and free floors from obstructions and slippery substances.
  - F. Free aisles, traffic areas, and exits of materials and other debris.
  - G. Dispose of combustible materials properly or store in approved containers.
  - H. Store oily rags in self-closing or spring-lid metal containers.
  - I. Know the proper procedures to follow in keeping the work area clean and orderly.
  - J. Keep a sufficient number of brooms, brushes, and other housekeeping equipment readily available.
- VI. Classes of fires:
- A. Class A—Fires that occur in ordinary combustible materials such as wood, rags and rubbish.
  - B. Class B—Fires that occur with flammable liquids such as gasoline, oil, grease, paints, and thinners.
  - C. Class C—Fires that occur in or near electrical equipment such as motors, switchboards, and electrical wiring.
  - D. Class D—Fires that occur with combustible metals such as magnesium.
- VII. Components of the fire triangle:
- A. Fuel—Any combustible material.
  - B. Heat—Enough to raise the fuel to its ignition temperature.
  - C. Oxygen—Necessary to sustain combustion (NOTE: to produce fire these three elements are necessary and must be present at the same time. If any one of the three is missing, a fire cannot be started; with the removal of any of them, the fire will be extinguished.)

- VIII. Types of fire extinguishers:
- A. Pressurized water—Operates usually by squeezing a handle or trigger; used on Class A fires.
  - B. Soda acid—Operates by turning extinguisher upside down; used on Class A fires.
  - C. Carbon dioxide (CO<sub>2</sub>)—Usually operates by squeezing handle or trigger; used on Class B and C fires.
  - D. Dry chemical—Operates usually by squeezing a handle, trigger, or lever; used on Class B, C and D fires. (NOTE: On Class D fires, dry sand is as effective as any dry chemical other than Purple X. The cost of the Purple X chemical places it out of reach of most shops.)
  - E. Foam—Operates by turning extinguisher upside down; used on Class A and B fires.
- IX. Equipment-specific tests must be developed and administered.

# General Safety Test

1. Define the following terms:
  - a. Safety –
  - b. Accident –
  - c. First aid –
  
2. Match the following colors of the safety color code with the correct statements of their use.

<ol style="list-style-type: none"><li>a. _____ Designates caution.</li><li>b. _____ Used to identify the location of fire fighting equipment.</li><li>c. _____ Designates the location of safety and first aid equipment.</li><li>d. _____ Designates dangerous parts of equipment which may cut, crush, shock or otherwise injure.</li><li>e. _____ Designates caution against starting equipment while it is being worked on or against the use of defective equipment.</li><li>f. _____ Designates traffic flow.</li><li>g. _____ Designates radiation hazards.</li></ol>	<ol style="list-style-type: none"><li>1. Green</li><li>2. Black and white</li><li>3. Orange</li><li>4. Purple</li><li>5. Red</li><li>6. Yellow</li></ol>
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3. List five personal safety rules.
  - a.
  - b.
  - c.
  - d.
  - e.
  
4. List eight rules for general shop safety.
  - a.
  - b.
  - c.
  - d.
  - e.
  - f.

g.

h.

5. List five methods used to maintain a clean and orderly shop.

a.

b.

c.

d.

e.

6. Match the classes of fire with the correct statement defining each class

- |          |  |            |
|----------|--|------------|
| a. _____ | fires that occur with flammable liquids such as gasoline, oil, or grease                             | 1. Class A |
| b. _____ | fires that occur in ordinary combustible materials such as wood, rags, and rubbish                   | 2. Class B |
| c. _____ | fires that occur in or near electrical equipment such as motors, switchboards, and electrical wiring | 3. Class C |
| d. _____ | fires that occur with combustible metals such as magnesium   |            |

7. List the three components of the fire triangle.

a.

b.

c.

8. Write the number of numbers of the fire extinguisher best suited to extinguish each class of fire.

- |          |  |                                     |
|----------|--|-------------------------------------|
| a. _____ | fires that occur with flammable liquids such as gasoline, oil, or grease                             | 1. pressurized water                |
| b. _____ | fires that occur in ordinary combustible materials such as wood, rags, and rubbish                   | 2. carbon dioxide(CO <sup>2</sup> ) |
| c. _____ | fires that occur in or near electrical equipment such as motors, switchboards, and electrical wiring | 3. dry chemicals                    |
| d. _____ | fires that occur with combustible metals such as magnesium   | 4. soda acid                        |
|          |  | 5. foam                             |

9. Where are the MSDS kept in our lab?

10. When it is necessary to leave a machine for even a short period of time, you should
  - a. Let the machine idle in neutral.
  - b. Let the machine run so you don't lose your place.
  - c. Hang a caution sign on the machine so others will know it is running.
  - d. Turn off the machine.

# General Safety Test

## ANSWERS TO TEST

1.
  - a. State or condition of being safe; freedom from danger, risk, or injury.
  - b. Includes any suddenly occurring, unintentional event which causes injury or property damage.
  - c. Immediate, temporary care given the victim of an accident or sudden illness until the services of a physician can be obtained.
  
2.
  - a. 6
  - b. 5
  - c. 1
  - d. 3
  - e. 6
  - f. 2
  - g. 4
  
3. Any five of the following:
  - a. Wear shop clothing appropriate for the instructional activity being performed.
  - b. Confine long hair before operating rotating equipment.
  - c. Always wear safety glasses; use suitable helmets and goggles for welding.
  - d. Remove ties when working around machine tools or rotating equipment.
  - e. Remove rings and other jewelry when working.
  - f. Conduct yourself in a manner conducive to safe shop practices.
  - g. Use soap and water frequently as a method of preventing skin disease.
  
4. Any eight of the following:
  - a. Keep all hand tools sharp, clean, and in safe working order.
  - b. Report any defective tools, machines, or other equipment to the instructor.
  - c. Retain all guards and safety devices except with the specific authorization of the instructor.
  - d. Operate a hazardous machine only after receiving instruction on how to operate the machine safely.
  - e. Report all accidents to the instructor regardless of nature or severity.
  - f. Turn off the power and make certain the machine has stopped running before leaving.
  - g. Make sure all guards and barriers are in place and adjusted properly before starting a machine tool.
  - h. Disconnect the power from machine tools before performing the maintenance task of oiling or cleaning.
  - i. Use a solvent only after determining its properties, what kind of work it has to do, and how to use it.
  - j. Use correct properly fitting wrenches for nuts, bolts, and objects to be turned or held.
  - k. Keep the shop or laboratory floor clear of scraps and litter.

- l. Clean up any spilled liquids immediately.
  - m. Oily rags or oily waste should be stored in metal containers.
  - n. Clean the chips from a machine with a brush-not with a rag or the bare hands.
  - o. Do not use compressed air to clean your person or clothing.
- 5.
- a. Arrange machinery and equipment to permit safe, efficient work practices and ease in cleaning.
  - b. Stack materials and supplies safely or store in proper place.
  - c. Store tools and accessories safely or store in proper place.
  - d. Clear working area and work benches of debris and other hazards.
  - e. Clean and free floors from obstructions and slippery substances.
  - f. Free aisles, traffic areas, and exits of materials and other debris.
  - g. Dispose of combustible materials properly or store in approved containers.
  - h. Store oily rages in self-closing or spring-lid metal containers.
  - i. Know the proper procedures to follow in keeping the area clean and orderly.
  - j. Keep a sufficient number of brooms, brushes, and other housekeeping equipment readily available.
- 6.
- a. 2
  - b. 1
  - c. 3
  - d. 4
- 7.
- a. Fuel
  - b. Heat
  - c. Oxygen
- 8.
- a. 2, 3, and 5
  - b. 2 and 3
  - c. 1, 4, and 5
  - d. 3
9. Answer should be specific to school.
10. (d) Turn off the machine.

# **Resources**

## **Appendix J**

# Resources

The following list of groups, organizations, state agencies and other resources is provided to assist instructors, program directors and others in their efforts to obtain information that will assist them in providing a safe environment for students of all ages. This list of resource groups should not be considered a comprehensive list of all of the possible resources that can be of assistance, or who have information about possible resources or about any of the elements of safety. Rather, it should be viewed as a starting point and should be supplemented as new resources become available.

## **Utah State Division of Risk Management**

5120 State Office Building  
Salt Lake City, UT 84114  
801-538-9560  
[www.risk.state.ut.us](http://www.risk.state.ut.us)

The Division of Risk Management provides support in preventing liability situations by conducting reviews and facility audits. Division staff are available for consultation and assistance in policy development, facility and equipment audits, and resolving individual situations and problems. Risk management also provides liability and property insurance coverage for almost all state education agencies.

## **Utah State Office of Education ATE Specialists**

250 East 500 South  
P O Box 144200  
Salt Lake City, UT 84114-4200  
801-538-7500  
[www.usoe.k12.ut.us](http://www.usoe.k12.ut.us)

The ATE Specialists of the Utah State Office of Education are experts in specific areas of Applied Technology Education and are available to provide specific assistance in various aspects of each program, including how to develop curricula, how to implement safety programs and how to perform other aspects of ATE programs. Staff are also available to assist in the design of new facilities, or in the redesign of existing facilities.

## **Utah State School Board Association**

83 East 7200 South  
Midvale, UT 84047  
801-566-1207

The School Boards Association is available to serve as a clearinghouse of information, or to assist interested parties in locating specific sources writing of policies and procedures.

**Utah State Fire Marshal's Office**

5272 College Drive, Suite 302  
Murray, UT 84123-2611  
801-284-6350 Fax: 801-284-6351  
[www.fm.state.ut.us](http://www.fm.state.ut.us)

The Utah State Fire Marshal's Office is available to consult with agencies on issues surrounding fire safety, as well as compliance with and enforcement of various fire codes and building codes as they relate to fire safety.

**Utah State Labor Commission**

160 East 300 South  
Salt Lake City, UT 84111  
801-530-6908

The Labor Commission is responsible for the enforcement of the various state safety and health statutes and for the enforcement of the OSHA requirements in Utah. The commission has created a special consultation/education/training unit that is available to assist in identifying violations or problems, and in resolving them before an accident or a more serious violation occurs.

**Utah State Department of Environmental Quality**

288 North 1460 West  
Salt Lake City, UT 84101  
801-538-6170  
[www.eq.state.ut.us](http://www.eq.state.ut.us)

The newly created Department of Environmental Quality can provide specific assistance on problems of hazardous waste and toxic waste and in dealing with unique problems associated with certain chemicals.

**Utah Safety Council**

5263 South 300 West, Suite 201  
Salt Lake City, UT 84107  
801-262-5400  
[www.usc.state.ut.us](http://www.usc.state.ut.us)

The Utah Safety Council is an excellent source of general safety information and has a good film library. The Council also has a number of pamphlets and other materials available and can also serve both as a source of information and as a referral to other agencies or groups. The Council also offers a wide array of products and services for those in the occupational safety field. Products available from the Utah Safety Council include items relating to safety and health management, compliance and reporting, safe workplace conditions, employee training, emergency response, awareness and motivation, and off-the-job safety and health.

### **Local Health Departments**

Some local health departments may be able to assist in answering certain questions about the use of chemicals or other health-related problems.

### **Major Employers in Each Geographic Area**

Many major employers throughout the state have developed extensive safety plans and programs. Many of these companies are willing, as part of their public relations or community service programs, to share their experience and expertise. It may be worth the time of administrators, ATE directors or others to contact these employers and to explore the possibility of having the employers assist in the ATE programs.

### **Fairmont Supply Company**

P.O. Box 27356  
3760 West 2400 South  
Salt Lake City, UT 84120  
801-972-4920

Full-line safety products which meet customers' needs in terms of sales, service, training, and problem solving. This company has 27 locations representing quality products from leading manufacturers at competitive prices. Call for personal protective equipment and associated products.

### **Lab Safety Supply**

P. O. Box 1368  
Janesville, Wisconsin 53547-1368  
1-800-356-0783  
1-608-754-2345

***Personal protection:*** disposable clothing, gloves, eyewear, face shields, hardhats, hearing protection, fall protection, eye-wash-respirators, welding, ergonomics, protective footwear, incentives.

***Storage and handling:*** safety cans, cabinets/storage systems, gas cylinders, bottle carriers, lab ware, fume removal, refuse containment.

***Training/Maintenance:*** maintenance, safety tools, security, ladders, matting, traffic, towels. HAZMAT response, chats/training, books.

***Hazard control:*** signs, labels, spill control, asbestos control, vacuums, mercury, radiation, radon, bio safety, liquid/solid sampling, confined space, shipping, DOT, first aid, air monitors.

### **Michigan First Aid & Safety Company**

22900 Industrial Drive East  
St. Clair Shores, Michigan 48080  
1-800-221-9222 Fax: 1-313-774-2760

Safety glasses, respirators, goggles, first aid supplies, welding equipment, hearing protection.

**Safety-West, Inc.**

2500 South Decker Lake Blvd. #9  
West Valley City, UT 84119  
801-972-5800

First aid, gloves, head protection, foot protection, clothing and body protection, asbestos removal equipment, hazardous material protection, respiratory protection, eye protection, hearing protection, disposables, fall protection, instruments, flammable liquid handling, miscellaneous.

**Workers Compensation Fund of Utah**

Safety and Loss Prevention  
554 South 300 East  
Salt Lake City, UT 84111  
801-288-1073  
[www.wcf-utah.com](http://www.wcf-utah.com)

The Fund provides Safety and Loss Control services to policyholders. Services include assistance with effective safety program development and review, loss prevention, hazard (outside) analysis, loss review and management, and employee training. The Fund also provides educational assistance on workers' compensation topics to professional, educational, and other interested groups.

**Zee Medical Service Company**

4175 West 5345 South  
Salt Lake City, UT 84118  
801-965-6200

First aid sales and service, first aid/CPR classes, safety training curriculum, and safety equipment.

## ADDITIONAL RESOURCES

Material Safety Data sheets (MSDS)

[www.ilp.com/msds/index.html](http://www.ilp.com/msds/index.html)

Hazardous Waste

[www.eq.state.ut.us](http://www.eq.state.ut.us)

Federal Occupational Safety & Health Administration (OSHA)

[www.osha.gov](http://www.osha.gov)

Utah Labor Commission/Utah Occupational Safety & Health (UOSH)

[www.labor.state.ut.us](http://www.labor.state.ut.us)

Utah State Division of Risk Management

[www.risk.state.ut.us](http://www.risk.state.ut.us)

Utah Department of Environmental Quality

[www.eq.state.ut.us](http://www.eq.state.ut.us)

National Fire Protection Agency (NFPA)

[www.nfpa.org](http://www.nfpa.org)

Utah State Fire Marshal's Office

[www.fm.state.ut.us](http://www.fm.state.ut.us)

International Conference of Building Officials (ICBO)

[www.icbo.org](http://www.icbo.org)

Utah Fire and Rescue Academy

[www.uvsc.edu/ufra](http://www.uvsc.edu/ufra)